THE ENGINEERING AND MINING JOURNAL

The Chinese Copper Coinage Question.

The recent large exportation of copper to China and its effect on the copper market of the World make the use to which the copper has been put a matter of great interest. The reason for the large exports of copper to China was for a long while a good deal of a mystery, but it finally became known that it was being bought chiefly for the issuance of a new coinage. As to the commercial results of this in China, the U. S. vice-consul at Hangchau writes in a recent report as follows:[1]

"The predictions made more than a year ago by students of affairs in China, as to the ultimate results that the wholesale establishment of mints for copper coinage would have on money values, are being rapidly fulfilled. Already several viceroys and governors of the Empire have issued proclamations forbidding the importation of these copper coins into their respective provinces. Nevertheless the various provincial mints continue to run at full blast, turning out millions of these cheap coins every 24 hours, and forcing the people to accept them. Is Hangchau there are two such mints, and the daily output is something like 1½ million of copper coins. These coins are nominally worth 10 cash. One year ago they were sold by the mints at the rate of 90 coins to one Mexican dollar. At present, however, the same coins can be bought at the rate of 98 to 105 for one Mexican dollar. The best of these coins, while selling normally for 10 cash each, are intrinsically worth only 6 to 6½ cash, while there is a huge quantity being forced into circulation by the provincial authorities through local banks that are worth only 3 to 5 cash each. A new mint established in Hangchau last May has been for five months past dumping coins of this latter kind upon the merchants of the city at the rate of 200,000 per diem.

"The results of this sudden inflation of the circulating medium have been to drive the old genuine copper cash almost entirely out of circulation; to raise the price of nearly all kinds of food stuffs and of fuel; to cheapen the copper coins themselves, owing to their plentitude, and to arouse general discontent among the masses of the people.

"The old copper cash, although grimy, bulky, and inconvenient to handle, has been the circulating medium among the Chinese for all minor business transactions for many hundreds of years, and to this the people are greatly attached. These old coins represent real value—many of them being composed of pure copper, and some even containing a little gold. And as a vast majority of the articles used in every day life are bought for a few cash each, oftentimes for less than 10 cash, it is obvious that to replace these old coins with coins of no less than 10 cash value would not only cause the poorer classes great inconvenience, but in a multitude of cases an actual loss."

Financial men in China are greatly disturbed over the rapidly increasing cost of living, and the apparent depreciation of the value of Chinese money. A writer in the Shanghai press recently expressed the opinion that, as the result of an extensive inquiry, he believed the trouble is almost entirely due to the reckless coinage of 10-cash pieces by the provincial mints in China, whose eagerness to gain present profits blinds them to the inevitable consequences of their action. Eighteen months ago the Mexican dollar (about 45c. U. S. gold) changed for 840 cash, and the Kuangtung 10-cash pieces, because they bore the inscription "100 equal $1," were accepted as of the value of 8 cash only. To-day the dollar changes for 1,050 cash, and these coins are worth over 10 cash each; that is, within 18 months the value of the currency employed by almost the entire population of the Chinese empire has depreciated no less than 25%, and 12 or 13 cash are required to-day to purchase what could be obtained for 10 cash a year and a-half ago. It is believed that so long as the ratio of exchange does not fall below 140 to 150 of these 10-cash pieces to the dollar, the provincial mints will find it profitable to coin them. The prospect of a possible further enhancement of 50% in prices is serious in view of the distress which must inevitably result to natives and foreigners alike. It is proposed to take active steps to impress on the Central Government the advisability of critically investigating the character of the policy now being followed by the provincial authorities, and to induce it to take necessary remedial action.

[1] United States Department of Commerce and Labor. *Daily Consular Report*, No. 2,430. Dec. 6, 1905.

Galvanized Hoisting Ropes.

The Transvaal Institute of Mechanical Engineers has been discussing the general subject of hoisting ropes, inquiring particularly into the causes that tend to reduction in tensile strength. In the October, 1905 number of the Institute's *Journal*, J. Moir describes a series of tests as to the efficiency of galvanizing for protection against corrosion by acid mine-water, and as to its influence on the tensile and torsional strength of wire.

The specimen wires were galzanized in the laboratory by dipping them into a melted zinc bath covered with zinc chloride; objection to this process was made on the score that irregularities in the thickness of the zinc coat thus crudely applied were sufficient to vitiate any determination of elongation or of torsional resistance.

To determine the advantage of galvanizing against corrosion, flat notches were filed to the centers of original and galvanized samples; the ungalvanized specimens were then coated with sealing wax except at the flat surface of the notch, while the galvanized wires were sealed only at the ends, leaving the notch open to electrolytic action. The exposed area of the flat notch on each specimen was then measured. Two pieces of each kind of wire were then placed for varying lengths of time in baths of dilute sulphuric acid of different strengths. The strongest solution contained 0.80% H_2SO_4 and the wires were immersed for two hours, after which the galvanized specimen showed the loss of 0.0032 gm. iron per square inch, or exactly half the loss sustained by the ungalvanized wire. The weakest solution contained 0.061% H_2SO_4, much more than the strongest mine-water, and the wires were submerged for 100 hours. In this test, the galvanized wire lost 0.0041 gm. per square inch, or little more than one-tenth the loss sustained by the ungalvanized, 0.0366 gm. per square inch.

The value of these tests was called into dispute for the reason that the wires had been submerged in the acid continuously, instead of intermittently, as would more nearly approach the conditions of practice. It was argued that the successive immersions and withdrawals of a mine rope would tend to concentrate the acid adhering to it, by repeated evaporations of water, until a corrosive of considerable strength might accumulate.

In tests on tensile strength, no striking difference could be observed between the galvanized and the original wire. In noting the percentage of elongation, however, the zinc-coated wire gave elongations nearly double those of the uncoated wire, the former ranging from 7.8 to 10.2% and the latter from 4.7 to 5.8%. Tested for torsion, 8-in. lengths of original wire averaged 30 turns before breaking, while three specimens of galvanized wire gave 5, 10 and 21 turns. The marked inferiority of the latter in this test was undoubtedly attributable to irregularity in the zinc covering, by which the torsional strains were localized at the point of least section. If galvanizing were carefully done, and the wire re-drawn, there is no reason to suppose that a galvanized wire should be inferior in rigidity to an untreated steel wire.

The properties of nickel steel are influenced not only by the proportion of nickel present, but also by the amount of carbon and manganese contained in the steel, as well as by whether or not the steel contains some other element besides the nickel, such as chromium, tungsten, or the like.

The Spassky Copper Mine, Ltd.

BY EDWARD WALKER.

An article by E. Nelson Fell on the copper mines at Yuspenssky, situated in the Kirghese steppes in southwest Siberia, appeared in this JOURNAL some time ago (Nov. 14, 1903, p. 731). Since that article appeared, the developments of the mine made under Mr. Fell's direction have proved the existence of a rich orebody. The importance of this has been fully recognized by investors in England and France; the Spassky Copper Mine, Ltd., the English company that was formed to acquire and work the properties, is amply supplied with capital. The political and social unrest in the Russian Empire is the one disturbing factor in the company's fortunes.

Before describing the latest developments in the mine, some details of its locality and history may be given. The company owns about 100 sq. miles of territory in the Kirghese steppes. The nearest large town is Akmolinsk, from which a post-road runs to Petropaulovsk, on the Siberian railway, 500 miles from Yuspenssky. These are shown in the accompanying map. The company also owns a smelter at Spassky, 70 miles from Yuspenssky and a large number of undeveloped copper prospects in the neighborhood of the smelter, as well as coal mines, ironstone mines, and limestone quarries. To avoid confusion with regard to the nomenclature of the mine in the minds of our readers, I ought to say that the mine is at Yuspenssky, and is called the Yuspenssky mine; but the company owning it and the other properties mentioned is called the Spassky Copper Mine, Ltd.

Work was started on the mine 40 years ago by Russian owners, and the rich oxidized outcrop was nearly exhausted. They had no knowledge of the treatment of sulphides, as may be judged from the fact that they mistook chalcocite for slate. One may wonder that the smelter should be so far away from the mine, and that

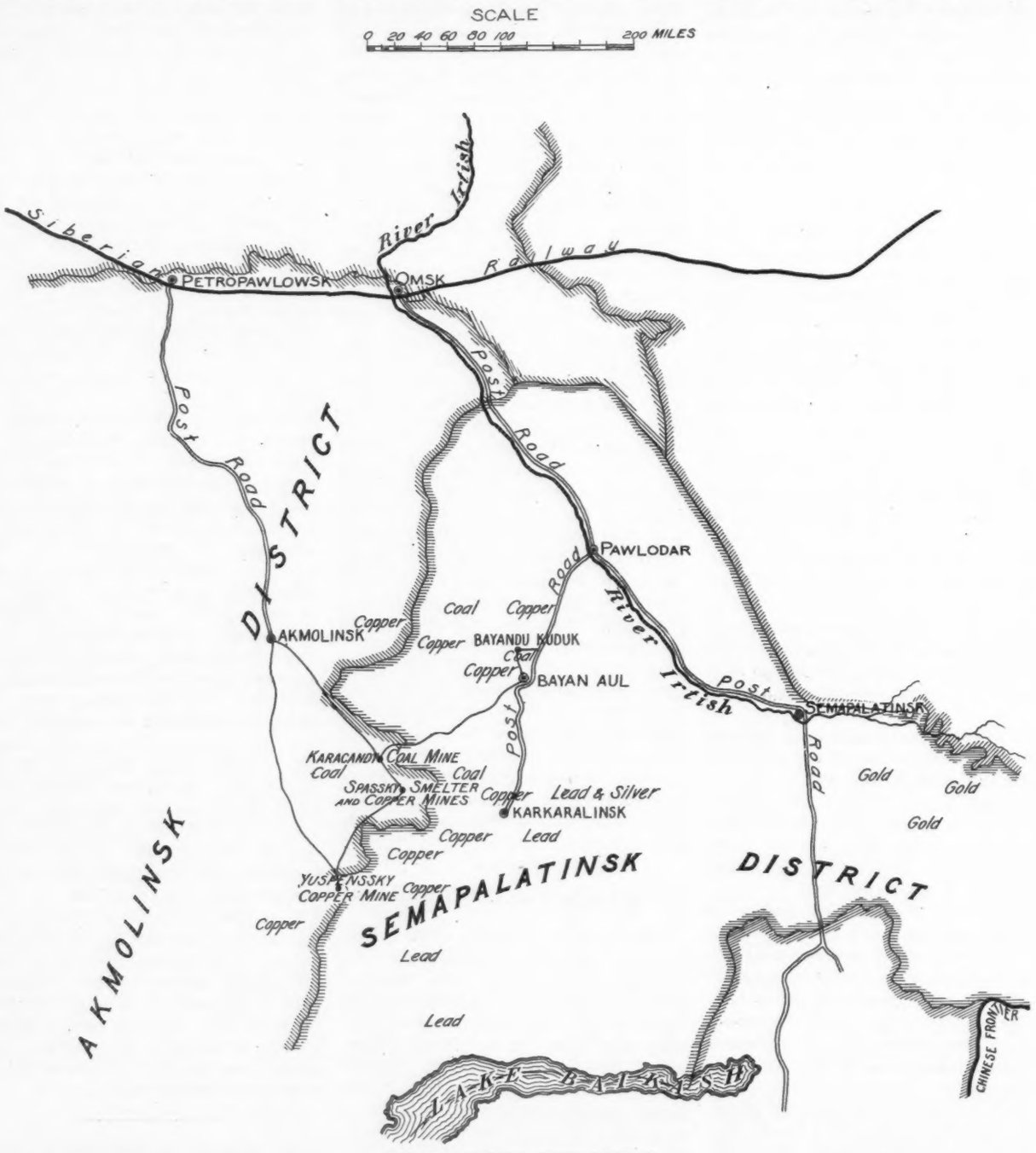


FIG. I. SPASSKY MINE DISTRICT.

the English company has not made a drastic reorganization. It is not necessary to go into detailed explanations; it is sufficient to say that the manners and customs, and the methods of life and business in those Eastern countries explain the apparent want of good management, and the difficulties in the way of an English-

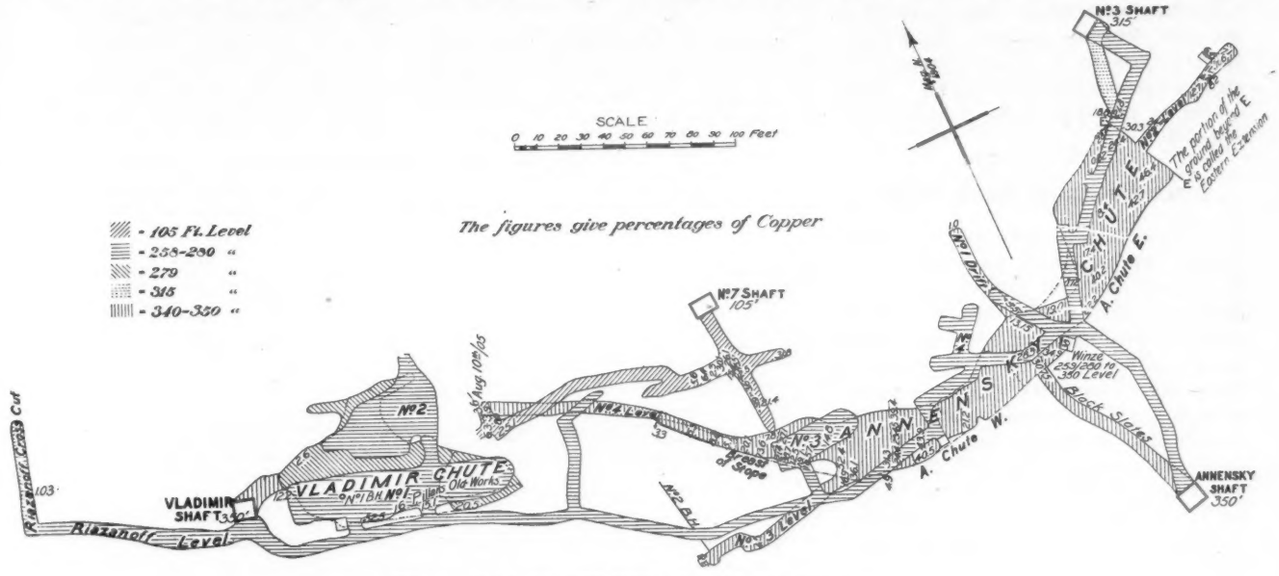


FIG. 2. PLAN OF WORKINGS OF SPASSKY MINE.

man who tries to reorganize and conduct operations on more reasonable lines. It may be added here, that owing to the close proximity of excellent supplies of coal, ironstone, and lime, and to the plentiful supply of reliable laborers among the Kirghese tribes, both the former owners of the present company have been able to conduct mining and smelting operations at considerable profit.

A plan of the workings brought up to Nov. 1, 1905, is shown in Fig. 2; a cross-section of the Annensky lode is given in Fig. 3. The district is in the form of an undulating plain. The orebody is in the form of an arc with its concave side to the north; the outcrop runs round a shallow valley. Five hundred feet north is a mound-like hill consisting of an intrusive porphyrite, while nearer the lode is a low ridge composed of rhyolitic breccia and coarse conglomerate grit which gradually changes into fine sandstone. The copper makes its appearance gradually in this sandstone (see the cross-section in Fig. 3, taken at the 350-ft. level in the middle of the Annensky lode); for 50 ft. it increases from a trace to 8%. In the next 20 ft. the contents become rich, and the last 2 ft. show solid bornite, or bornite and chalcocite mixed. Then there is a band of chalcocite a foot or less thick, after which comes 100 ft. of slate. This slate shows much crushing, and is full of slickensides. The line of fracture does not run so evenly as in the cross-section shown, but only approximately follows the contact of the sandstone and slate. It will be seen that the richest ore is nearest to the slate; and that the contents gradually diminish as the ore extends through the sandstone; in fact, the foot-wall is ill-defined.

There are two main shoots of ore that are being opened up; the Vladimir and the Annensky. The former is an irregularly shaped body about 115 ft. in length, with an average width of 33 ft. as far as stoped. The Annensky has been developed over a distance of 250 ft. at an average width of 25 ft.; but its eastern limit has not been found. The Vladimir contains several horses of slate, thus showing, as already mentioned, that the line of fracture is not along the line of contact; but the Annensky is much more regular. In the Vladimir shoot the ore was all extracted above the 259-ft. level before the present owners came in, except for arches and pillars left. Below this down to the 280-ft. level, the ore has partly been extracted during the past two years by underhand stoping, leaving underfoot floors of solid bornite. Below this level a bore-hole has been made 42 ft. deep, giving an average of 22½% of copper.

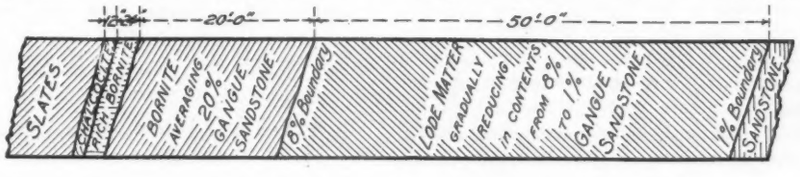


FIG. 3. CROSS SECTION OF ANNENSKY LODE.

In the Annensky shoot, the shaft has been sunk to the 350-ft. level, and connected with the orebody by a crosscut, from which drives have been made as shown, east and west. In this shoot everything above the 280-ft. level had been extracted. On the eastern part, the end of the orebody has not yet been reached. At the part now being explored, there occurs a break in the continuity, the effect of which is to change the character of the ore. The hanging wall gives place to grit conglomerate, and the dip slightly alters. The ores are more mixed, and there is more oxidized ore present. The indications show that the zone of enrichment is deeper than in the other parts of the lode.

In speculating on the possibilities for the mine with depth, the most important fact is that no trace of yellow sulphide has been found so far, even in the bore-hole made on the Vladimir; the inference is that the zone of enrichment will go down some distance yet, and that there are large bodies of ore yet to be opened up. During development work of the past two years, 7,200 tons of ore has been shipped to the smelter; the recovery has been 1,500 tons of copper, showing a copper content of 21%. Nov. 1, 1905, it was estimated that there were 70,000 tons of "assured" ore with 18½% copper; and over 4,000 of ore containing 50% of copper. In addition to this, the "probable" ore was 110,000 tons at 18½% copper; and nearly 7,000 tons at 50% copper. There is a great deal of ore in the mine that is not included in these estimates.

The ores have not so far been treated for precious metals, as their presence was not in important quantity. Quite recently the analysis of a copper ingot showed 40 oz. of silver and 4 dwt. of gold per ton of fine copper; further investigation is being made for values other than copper.

The intention of the company is to erect a new smelter capable of producing 300 tons of copper per month; at which output the ores mentioned will last for ten

years. If the developments proceed as anticipated, the plant will be enlarged. In the estimates anything less than 8% ore has not been included; it is impossible to say more than that large quantities exist. This is left as reserve until such time as the company may find it expedient to use it.

For this information, I am indebted to Mr. Fell and his partner, W. Pellew-Harvey; also to E. T. McCarthy, who made an independent examination. These gentlemen placed all their records at my disposal.

Concentration of Black Sands.

A second report from the Geological Survey's bureau, at the Lewis and Clark Exposition, Portland, Oregon, which has been engaged in testing samples of beach sand and sluice-box residue from points along the coast south of the Columbia river, where the presence of gold and platinum in paying quantities has long been suspected, gives information as to the results obtained by passing these sands over tables such as are in constant use in concentrating mills. The ordinary Wilfley, its Woodbury modification, and the Pinder tables were all tried, as well as the recent Christensen table, which here had its first employment.

Material.	III. Weight.	III. Assay per ton.	III. Ratio of value.	IV. Weight.	IV. Assay per ton	IV. Ratio of value.
	Lbs.			Lbs.		
Feed of original sand	1296	$0.320	1.00	2168	$0.018	1.00
Concen. No. 1	7	21.850	68.30	26	.302	16.80
Concen. No. 2	45	.060	.19	216	.....	
Tailing	1244	.054	.17	193	.015	.83

Analyses of black sands from placer-mine sluice-boxes, collected at various points, show the following composition, in pounds per ton of sand:

COMPOSITION OF SLUICE-BOX RESIDUES.

	1	2	3	4	5	6	7	8
Magnetite	1,181	1,146	1,387	26	175	1,463	561	629
Chromite	2	673	486	201	15	297	218	564
Garnet	370	....	42	709	81	trace	818	trace
Monazite	34	....	29	220	26	....	13	124
Zircon	66	25	21	231	46	4	21	392
Quartz	344	12	9	579	1,441	....	....	232
Gold and platinum	$0.15	$276	$7.44	$1.03	$26.33	$74	$231	$9.64

NOTE.—1. Placer mine at Ashland, Ore.
2. Placer mine at Sutter Creek, Ore.
3. Black sand from Carson, Nev.
4. Black sand from Boise, Idaho.
5. Black sand from Wallowa, Ore.
6. Black sand from Jacksonville, Ore.
7. Heavy concentrate from Toronto, Canada.
8. Black sand from Meadows, Idaho.

Sands from near the Columbia river showed the following mineral constituents in pounds per ton, except the gold and platinum, which are reported in cents per ton:

MINERALS CONTAINED IN CONCENTRATE FROM BEACH AND RIVER SAND.

	1	2	3	4	5		7	8
Magnetic iron ore	63.440	1.213	3.080	.9200	14.525	62.911	643.559	13.889
Ilmenite	47.720	.558	.701	.8389	2.581	24.543	177.392	3.367
Garnet	12.160	29.749	3.740	118.9351	3.658	30.458	174.478	131.308
Monazite	.108	.105	.012	1.3601	.096	.984	.800	.100
Zircon	.150	.008	.501	.1880	.130	.789	5.016	2.400
Gold and platinum	9.1	43.4	.3	.06	1.3	6.0	53.0	2.4

1. From Moore's Hotel, Seaside.
2. From Gearhart beach.
3. From West station.
4. From Carnahan station.
5. From Warrenton station.
6. From point 150 ft. north of Hammond railroad station.
7. From point 1,500 ft. west of Hammond railroad station at high-water mark.
8. From bottom of Columbia river at Pillar rock.

These beach and sluice-box sands are particularly amenable to table concentrating, for the reason that they have undergone a vigorous and long-continued classification into equal-falling grains, being even more perfectly sorted than the feed that mill tables ordinarily receive from spitzkasten or other hydraulic classifiers.

RESULTS OF CONCENTRATING TESTS.

Material.	I. Weight.	I. Assay per Ton.	I. Ratio of Value.	II. Weight.	II. Assay per Ton.	II. Ratio of Value.
	Lbs			Lbs.		
Original feed	4,089	$0.21	1.00	3,690	$0.003	1
Re-run feed	....	....	.....	92	.120	40
Re-run No. 1 concentrate	7	14.55	69.30	1	8.040	2,647
Re-run No. 2 concentrate	203	1.74	8.30	5	.397	132
Re-run No. 3 concentrate	.....	.....	.....	6	.085	28
Re-run tailing	none	....	.....	81	trace	
Original tailing	3,879	.08	.38	3,598	trace	

Results of concentrating are shown thus, samples I and II coming from the Pacific beach, and III and IV from a bar in the Columbia, near the mouth of Hood river.

In setting up a rock-drill see that the legs are set firmly in the rock; if necessary, point a hole for the leg pointer to sit in; if in a muddy place, or where the leg might not sit firm, put a common washer on a piece of wood 2 or 3 in. thick and let the leg rest on it; see that all the bolts are tight (and once in a while put a little oil on the threads of the bolts), when steam is used, blow out the pipe and hose before coupling to the drill; then fill the oil cup, and after the drill has started turn the handle down to the stop and the cup will feed the oil in the machine slowly.

There is more trouble with new rock-drills from lack of oil than from any other cause.

Cost of Chimneys.

Some interesting comparative costs of different types of chimneys are noted from the data of a constructing engineer. In the New York district, a brick stack, 350 ft. by 22 ft. core diam., was bid for at a lower price than a steel stack of the same size. Chimneys of radial brick, 275 ft. by 17 ft. core diam., were let by contract at prices roughly 10 per cent. less than for steel stacks of the same size. In the Boston district estimates for steel stacks, 125 ft. in height, were submitted at about 20 per cent. less than the lowest of the other type; in this case, the radial-brick chimney.

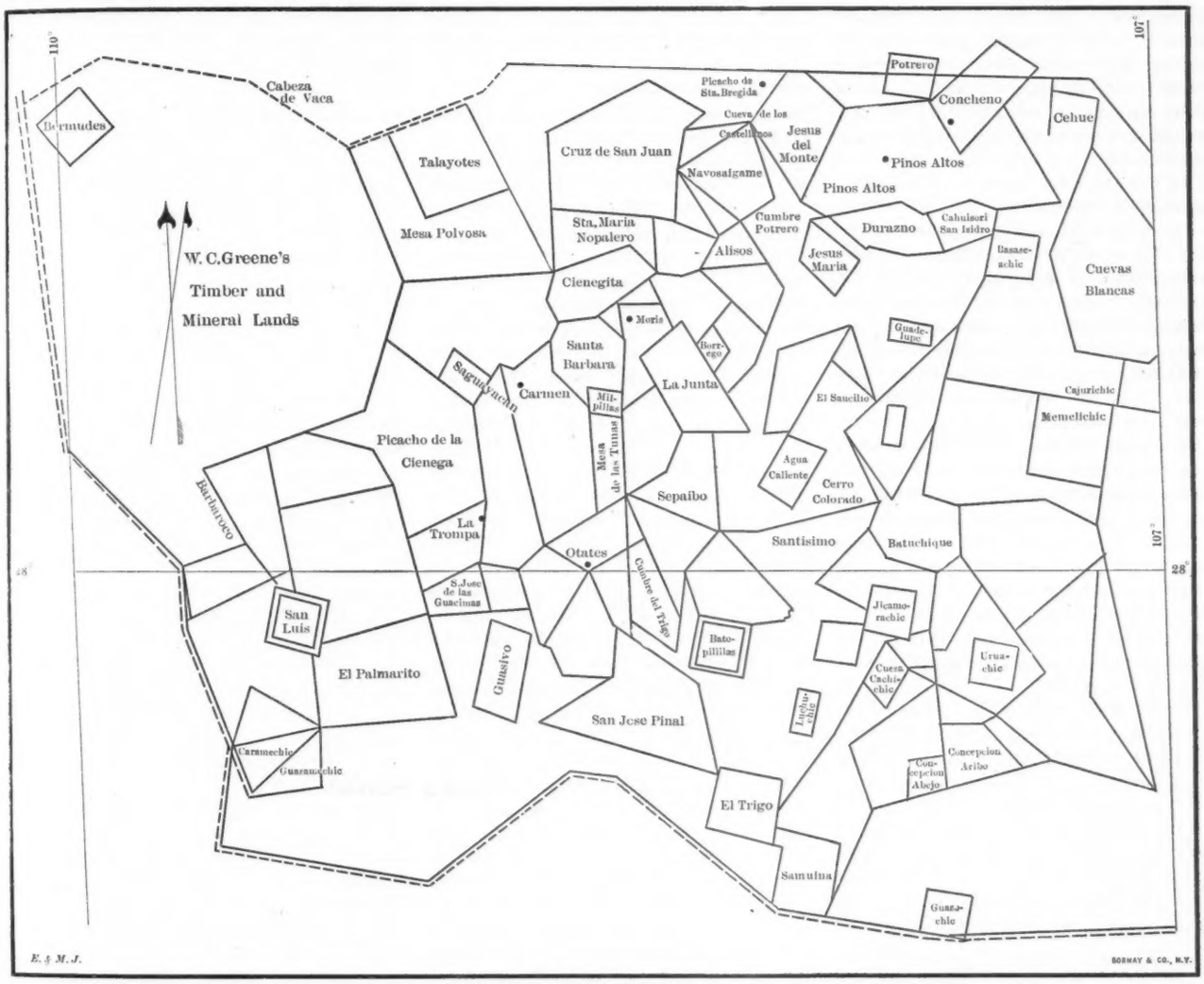
Generally speaking, the first cost of any given type of chimney varies with its locality and its size, as well as with the time in which it may be constructed. The steel chimney may, at periods of low prices for plates, be the cheapest form in some localities; and even at such times it may become the most costly, if the freight charges are high; as for instance, at some points in the West, where brick and mortar may be cheap on account of their local production. The cost of any type is so dependent upon local conditions, even aside from the labor cost, that it requires much experience and more judgment to make even a close approximation to the actual relative cost of the different constructions. Neither are these conditions confined to the place where the chimney is to be erected; they embrace the cost of raw material as well as of processes of manufacture; distance also, as may be anticipated from what goes before, plays no small part in the actual cost of the completed chimney.

Sodium amalgam possesses the property of wetting platinum without amalgamating with it, even when other metals are purposely added to the amalgam. This substance is, therefore, useful for effecting a quick and thorough cleansing of platinum. The amalgam is gently rubbed upon the metal with a cloth and then moistened with water, which oxidizes the sodium and leaves the mercury free to alloy with foreign metals. The mercury is then wiped off and the dish cleaned and polished with sand.

The Rayon District, Chihuahua.

BY THEO. A. P. BRONN.

The recent purchase of several well-known mining properties in this State has caused considerable immigration of mining and business men, who have come to make a personal examination of the Rayon district. They are all more or less troubled by lack of a reliable map, and as nearly all the different camps or towns have Indian names, difficult to remember, particularly to persons not familiar with the Spanish language, the accompanying map of the district may prove useful.



MAP OF THE RAYON DISTRICT.

This map is a tracing of the official map on file at Chihuahua, the capital of the State. The whole district is, so to say, mineral land, and with the aid of this map any mine owner can locate the exact position of his property.

The principal town is Ocampo (formerly know as Jesus Maria), which is the county seat. It is reached by railroad from Chihuahua to Miñaca, thence by muleback from the latter town to Ocampo in three days. A wagon road from Temosachic (railroad station) to Concheno mine is now being built, and, when completed, will be of great benefit to this district, Ocampo, the county seat, being five hours' ride from the Concheno mine.

A New Formation of Diamond.

In a lecture delivered before the British Association at Kimberly, South Africa, September 1905, Sir William Crooks stated (*Chem. News,* XCII., 1905, Page 148) that he had found what were, in all probability, microscopic diamonds in residue obtained by Sir Andrew Noble in exploding cordite in closed steel cylinders. Crookes had calculated the theoretical melting point of carbon as 4,400 degrees C. absolute, and the melting pressure as 16.6 atmospheres. He concluded that the conditions of the cordite explosion, with a pressure of 8,000 atm. and a temperature reaching about 5,400 degrees absolute would be favorable for the formation of diamonds. Upon examining the residues from such explosions, octahedral crystals were found which had high index of refraction, the proper cleavage, and the absence of birefringence. Although their other properties have not yet been determined, the treatment leads to the belief that they must be diamonds.

Space Economy in Steam Turbines.

An example of the saving in room that may be effected by the use of steam turbines in place of the reciprocating engine is seen at the Kent Ave. power station of the Brooklyn Rapid Transit Railway. A 5,500-kw. turbo-generator is being installed there, and, aside from the small room taken up by the unit itself, the size of the foundation is noteworthy. This is made up of concrete piers about 3 ft. square, supporting steel and concrete girders, to which the machine is bolted. The condenser is directly beneath the low-pressure end and the room available around and between the piers gives sufficient space for the auxiliaries without encroaching on the main floor. The saving effected is not confined to floor space alone, it extends to cubical contents, and to the cost of foundation and wall construction as well.

In placing concrete in two layers it is desirable to place the top layer before the first is set, or, in case this rule cannot be followed, a firm bond is secured by thoroughly scratching the first layer while it is soft.

The Cyanidation of Concentrates—Part II.*

BY BERNARD MACDONALD.†

From a study of the results shown in the table published in Part I of this paper, the most prominent feature is the fact that the percentage (15.5%) by weight of the concentrate that passed a 200-mesh screen contained 42% of the value. As the complement of this, but less striking, is the fact that the remaining 84.5% by weight of the concentrate contained only 58% of the value; or, each unit of weight, in the classification of the concentrate, that passed the 200-mesh screen, contained nearly 3 units of the average gross value, while each unit of weight of that portion of the concentrate too coarse to pass the 200-mesh screen, contained only 0.7% of the average value.

At this time the Wilfleys were making concentrate at the rate of 2.5% of the gross weight of the ore crushed, therefore the 15.5% of the 2.5% concentrates was equal to 0.385%, equivalent to, say, 7½ lbs. of each ton of the crude ore. Thus it will be seen that 42% of the value in each ton of the ore milled was contained in 7½ lbs. of material separated from the battery pulp as concentrate, and which was determined by the screen tests as their finest classification.

A microscopic study of the crude ore, showed that silver sulphides occurred disseminated throughout the quartz in isolated specks ("mosqueados") and in speck aggregations; and that these specks occur occasionally so fine as not to be individually distinguishable to the naked eye or even to the magnifying glass. In this latter condition, they give a bluish-black cast to the quartz.

Assays were made with a view of determining whether any considerable ratio of silver exists in the various varieties of vein quartz not showing any of these sulphide impregnations. Uniform results indicated that the vein quartz not showing these sulphide impregnations, is practically without metal value. This agrees with the general conclusions that the quartz matrix of veins does not contain metallics.

The Wilfleys in the Sirena mill extract from the pulp, say, from 40% to 50% of the gross value as concentrate, weighing approximately 2.5% of the crude ore. The 50% or 60% of the value of the crude ore remaining in the pulp, flows off in the Wilfley tailing which is, say, 97.5% by weight of the crude ore milled.

The main object of research now under consideration is: *"Why did not the concentrate and the unconcentrated pulp yield a satisfactory percentage of their values in the experimental cyanide tests?*

In order to answer this question, two other cyanide tests were made on the concentrate; one on the very finest screen-classification produced; the other on a mixture of all the screen classifications other than the finest shown in the table given in Part I of this paper.

The first of these, (test No. 1) was made on the screen classification of the concentrate that passed a 200-mesh screen. This was treated as a slime, by agitation in the method already described for a period of 108 hours, using a solution brought up daily to a cyanide strength of 2.5%. After this treatment, the residue pulp was washed and assayed; it gave results which showed that 97% of the gold and silver values had been dissolved out, in treatment.

The second (test No. 2) was made on all the screen classification products other than that included in test last above described; it was treated the same as test No. 1 in every respect. The assays of the pulp residue in this latter case, however, showed that an extraction of only 42.5% of the values had been affected in the treatment. It should be stated that a microscopic examination was made of the several screen classifications of the concentrate. It was seen that the classification which passed 200 mesh, showed no distinguishable quartz or silica grains; the material seemed to be composed of sulphides of iron or silver, in a minute granular form, with a small percentage of brownish powder (gold?). The coarser classifications contained an appreciable amount of visible quartz grains which were noticeably greater in the coarser classifications and diminished in the finer. As a rule, all the larger quartz grains had a bluish or blackish cast, evidently containing inclusions of pyritic material in grains of excessive fineness.

The conclusion was then reached: That the silver sulphide in the coarser screen classification made from the concentrate was either: (a) not sufficiently liberated from the enveloping quartz to permit it to come in contact with the cyanide solution; or (b), if so freed from the quartz matrix, the time employed in the treatment was too short to allow of a complete dissolution by the cyanide solution.

Tending to corroborate this speculation is the fact that microscopic examination of the residue-pulp of test No. 2, showed that the faces of the larger pyrite cubes were as smooth and lustrous after the cyanide treatment as before.

To put this to a practical test, the residue pulp of the test last described, was reground to pass a 200-mesh screen; this product was treated in a similar way (in manner and time) as formerly, but with the exception that only a 1% cyanide solution was used. After this latter treatment, the residue pulp was assayed, and showed an extraction of 92% of the value in it before it was subjected to this second treatment.

This result furnished the key to the right line of investigation; it proved conclusively that: *the concentrate can be extracted by cyanidation to 92% or 97% if the product is previously ground fine enough to pass a 200-mesh screen.*

Apparatus Used in Tests.—After the general determination in the manner described, a large number of tests were afterwards conducted in three small conical-bottom vats, having a capacity of 20 kilos. In these vats, treatment was always conducted by the slime method, the agitation being entirely effected by pumping the pulp and solution from the bottom of the vat by a small centrifugal pump and throwing it back again over the surface of the same tank. While thus being pumped, air was admitted through the suction of the pump so that it became thoroughly churned and mixed with the pulp by the rapid revolutions of the pump vanes. When discharged from the pump column, the pulp was thrown on the apex of an umbrella-shaped distributing apron, down which it ran in thin sheets.

The exposure to the air, and the intermixture that the pulp and slime obtained by thus rolling down the distributing apron in thin sheets, were designed to give additional opportunity for aëration; I believe this method of exposure and mixing of the pulp resulted in increased extraction, for the results of these larger tests showed, as a rule, higher extraction than did the bottle test. I believe that all slime treatment would be generally improved by the adoption of this method or some modification of it, on account of the facilities it would offer for thorough aëration and mixture of the pulp and solution. In ordinary practice (where agitation of slime is affected by drawing from the bottom of tanks by 6-in. centrifugal pumps, and throwing this product in a stream on the surface of the tank again at the rate of 800 gal. per min.), little opportunity is given for a thorough mixing and aëration of the pulp, and this notwithstanding that an air jet may be admitted to the suction pipe of the pump for aëration purposes.

Summary.—(1) The valuable constituents of the ores of the Veta Madre consist of simple sulphides of silver and iron, which occur generally disseminated throughout the quartz matrix in grains, or aggregates of grains, of exceeding fineness. (2), When the ore is crushed in the battery, such of the resultant sand as is coarse enough to remain on a 40-, 60, 80- or even on a 100-mesh screen, is large enough to envelope many of the finest individual grains of these sulphides. (3), Such of the sulphide grains as may happen to be thus completely sealed up in the larger quartz grains are inaccessible to contact with the cyanide solutions and are, therefore, not affected by the treatment. (4), When such pulp grains are discharged after the treatment, they, of course, carry off nearly all the

*Continued from this JOURNAL, Dec. 23, 1905, page 1160.

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silver and gold values originally contained. (5), As far as the sand portion of the pulp goes, the "values lost in the tailings" may be wholly accounted for in this way.

There is no question in my mind that this condition accounts exclusively for the low extraction obtained from the tests made on the unconcentrated mill pulp and on the coarser screen classification of the concentrate; for it has been shown by the tests that the 15% of the concentrate fine enough to pass 200-mesh, (and which carried 42% of the total gross value) yielded a high percentage (97%) of the value to cyanidation, while it has also been shown that the coarser classifications of the concentrate that yielded only 42% of its value, would, when crushed fine enough to pass through 200 mesh, yield well over 90 per cent.

It has also been shown (6), that there is 30% by weight or 661 lb. of silica in each ton of concentrate; that this silica has been shown by the microscope to be generally in the form of large grains and splinters of quartz, and there have been included in them grains of dark material supposed to be silver sulphide. These quartz grains (silica) weighing in the aggregate, 661 lb. in each ton of concentrate, could easily contain from 40% to 50% of the total silver sulphides so completely sealed up as to be quite inaccessible to the cyanide solution.

I am convinced that the loss of value contained in the tailing flowing from the Wilfleys was due mostly, (a) to silver sulphides so finely disintegrated in the crushing process that it could not be recovered with the concentrate on the Wilfleys, but was carried off with the tailing; and (b) to the grains of silver sulphide that happened to be partially or wholly enveloped or sealed up in the quartz sands. With proper exposure to cyanide solution of suitable strength, practically all the silver value in the sulphide grains, if ground fine enough, could be extracted.

It is reasonable to admit that the fine grains of silver sulphide that are entirely enveloped or sealed up in agate-quartz grains would remain unaffected throughout the ordinary course of cyanide treatment.

In conclusion, the concentrate made from these ores, if reground, along with an equal weight of the coarser quartz-sand, and to a fineness that will pass the whole product through a 200-mesh screen, will yield fully 95% of the value by cyanidation in a plant especially designed for treating this character of material; the treatment costs in a well constructed plant would be reasonably low.

The amount of sands which it would be advantageous to grind with the concentrate could be easily included by making the concentrate "dirty"; that is, including the coarser sand-streak next adjoining on the head of the Wilfley tables. It is my opinion that the sulphides locked up in these coarse sands are responsible, in large measure, for the values in the tailing of the sand treated by percolation; regrinding would liberate the sulphides of silver locked up in them, leaving them accessible to cyanide contact. Being reground with the coarse quartz sand, the sulphide crystals would be more thoroughly disintegrated and, therefore, the better prepared to yield their values to cyanide treatment.

The plant necessary for the cyanidation of the concentrate of the Veta Madre ore, world be a small one, comparatively speaking, for the concentrate, as now made, amounts to only 2.5% of the weight of the crude ore; as such, it contains 30% of silica. The weight, therefore, of the concentrate without silica, would be only 1.75% of the crude ore. With 100% of silica or quartz included, the weight of the concentrate would be 3.5% of the crude ore, so that a plant for treating the concentrate of 250-tons of mill pulp, would require to have a daily capacity of only 8.75 tons or, say, 10 tons. The Directors of the Guanajuato Consolidated Mining & Milling Co. are now giving their consideration to the type of plant that will be best suited for the treatment of concentrate under the conditions which obtain in this camp.

Experience versus Experiments.—It is interesting to contrast actual commercial practice (as carried on in the cyanide plant of the Guanajuato Consolidated Mining & Milling Co., now treating the Wilfley tailing) with the empirical (and more or less random) methods employed in the laboratory tests, especially as regards the strength of the solutions used. In the plant, the sand and slime are separated by gravity-settlement and by hydraulic classification; each of these products is treated separately as follows:

Slime Treatment.—This is effected by agitation and decantation in steel tanks, 30-ft. in diameter by 10-ft. in depth, the agitation being effected by mechanical stirring and pumping. The slime charged into the tanks is exposed to seven times its dry-weight of solution having a strength of 0.05% cyanide. The agitation lasts for 3 hrs., during which the pulp is stirred and pumped over, the capacity of the pump being such that the entire tank charge goes through the pump three times in this period, being drawn from the tank bottom and thrown on the top. The charge is then allowed to settle for decantation; this operation is repeated four times more, but with a 0.04% solution.

The total average treatment-time given a slime charge is 65.3 hrs., and the average quantity of solution decanted off amounts to 135 tons for each wash. The solutions are kept at an "alkalinity" of 1.05 lb. to the ton. After this treatment in the agitation tanks, the slime charge is pumped into settling tanks, 30-ft. high and 18-ft. in diam. for further settling and decantation. After decantation here, the slime is discharged, this being the final operation in the treatment.

Sand Treatment.—The sand is treated by gravity-percolation in steel tanks, 26-ft. in diam. and 6-ft. deep. The treatment consists of: (a), Six (medium strength) washes of 0.15% solution, run on at 8-hour intervals; (b), 12 hours after the six medium washes, the first strong solution (0.3%) is run on, and the treatment proceeds with these "strongs" at 12-hour intervals until 18 or 20 have been run through the charge; (c), 12 hours after the 18th or 20th strong solution, as the case may be, had passed through the charge, 6 weak washes are run through at 4-hour intervals, mainly for the purpose of recovering the charged solution which may remain in the sand near the bottom of the tanks. The washes on the sand tanks require 10 tons of solution.

Lime is added at the rate of 6 lb. per ton of pulp, beside that which is necessary to keep the solution up in alkalinity. The difference between the strength of solutions used in the laboratory tests and those used in the ordinary working practice will be of interest.

Platinum wire is rapidly becoming a standard for protective fuses in electric circuits of small current capacity. The fact that this metal does not oxidize at any temperature greatly increases the surety of the interruption of the electric circuit only at the predetermined point. For telephonic and telegraphic circuits it is admirably adapted, as the small section of metal required renders the cost insignificant.

The loosening effect of the Bunsen flame upon the surface of platinum exposed to its action produces the familiar gray appearance which cannot be removed except by burnishing. Platinum triangles often become gray and very brittle from the same cause. Systematic application of moist sand to all articles affected in this way, after use, will keep them in good condition and materially prolong their life, with but a trifling loss in weight.

Leather belts should not be run against the finished grain; this makes them rough up. Should the belt by mistake be run against the grain, take the belt off, give it a coat of beeswax and put it back to run with the grain. The direction of the grain is easily determined by running the finger back and forth over the flesh side.

The best way to loosen a valve bonnet is to hold it firmly by the squares in a good vise, screw a piece of pipe well into the valve end, and then give a quick, strong pull on the pipe.

Deep Placer Deposits of Victoria.

BY H. L. WILKINSON.*

It is impossible to deal with all the conditions which affect the gold detrital deposits of Victoria; I intend only to enumerate the principles which have affected the value of the regularly defined deep placers or "deep leads." Much that is said would be equally applicable to small surface leads or gutters which form the head sources of these larger and more regular deposits.

Victoria has had some rich surface alluvium; the State still possesses immense auriferous deep placer deposits occupying the beds of ancient river channels which have silted up, or have been filled with a basaltic flow, to a depth of several hundred feet. These larger deposits have been worked to some extent, but many miles still remain merely located by boring. On account of the expenditure necessary to prove the value of a lead a clear conception of certain features will save money in sampling bores which are at best unsatisfactory, or in pumping to drain a small section of lead to allow of a small portion of the wash being actually tested. Although one cannot tell by deductions from these conditions whether a low-grade proposition will be payable or not, yet, by consideration of the observable conditions under which the deposits were laid down, a payable lead might be distinguished from one that will be totally unprofitable, due allowance of course being made for the uncertainties which surround every prospective problem. It will be well to give in general terms an account of the lead system of Victoria.

As will be seen (Fig. 1) the leads trend north and south from a central divide or ridge running east and west through the State. This main ridge, as well as the various spur ridges which divide the different lead systems are, generally speaking, situated similarly to the dividing ridges between the present rivers flowing down the respective valleys, which have been silted up by the ordinary river action or have been filled by a basaltic flow of comparatively recent date.

The leads trending north probably debouched into an immense basin or arm of what was then a sea, which has been silted up until the plains of northern Victoria and south-western New South Wales were formed; to the south they fell into another large basin now covered with a basaltic overflow. As will be seen (Fig. 1) the northern watershed was much longer and had a more gradual slope than the southern; the main east-and-west dividing ridge gradually moved south up to the time of the basaltic overflow. These buried placer deposits or deep leads are usually considered to belong to the Upper Pliocene.

The bedrock for most of the leads already exploited in Victoria is composed of Silurian slate and sandstone; but, in some few cases and for small distances, the gravel deposits lie on igneous rocks or on glacial conglomerate which formed the moraines of glaciers previously occupying the valley. The Silurian strata have been much contorted and folded; the strike of the beds is nearly north and south; the dip is more or less vertical, hence the quartz reefs which these rocks contain have a similar strike and dip.

Auriferous Zones.—Owing to the great age of these old river valleys in Victoria the streams depositing the leads long since reached their base-level of corrosion; it is only at the sources of the present rivers that corrosion is at present going on actively in the country rock. Consequently, it may be said that every river in Victoria which flows over a restricted flood-plain or basaltic flow has a gravel deposit on the bedrock containing the mineral concentrates of the whole valley filling.

The situation of quartz mines and old alluvial diggings indicates that there are several well defined zones stretching in a north-and-south direction, over the whole of which gold has been found. Between these auriferous zones each of which has characteristic quartz reefs, are areas of Silurian rock which are barren of gold. It is obvious that those leads which are situated on the auriferous zones are more or less gold bearing; while those off them are practically barren except where the gravels are in close proximity to small quartz stringers, which occur in isolated places throughout the non-auriferous zones.

Local Enrichment in Auriferous Zones.—The estimation of the zones is purely qualitative. One may say that gold in quantity is, or is not, contained in the gravels of leads on the auriferous or non-auriferous zones, respectively; but throughout the auriferous zones there are distinctive parallel lines of reef which enrich the gravels in their vicinity.

Fig. 2 shows the enriching belts of the Loddon system; the presence of these belts has been proved to a large extent by actual reef-mining; but more particularly by the old alluvial workings (both shallow and deep). Many of these latter workings are

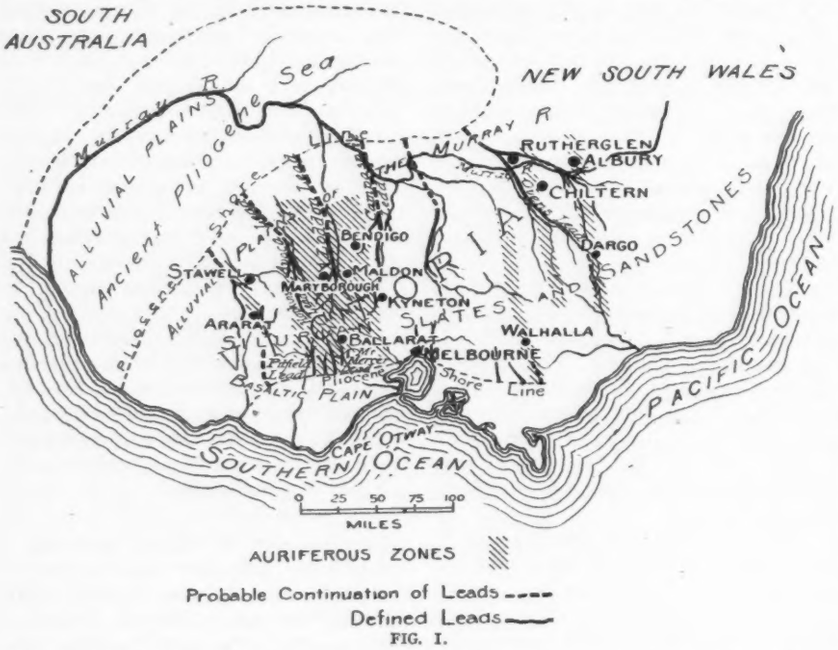

FIG. 1.

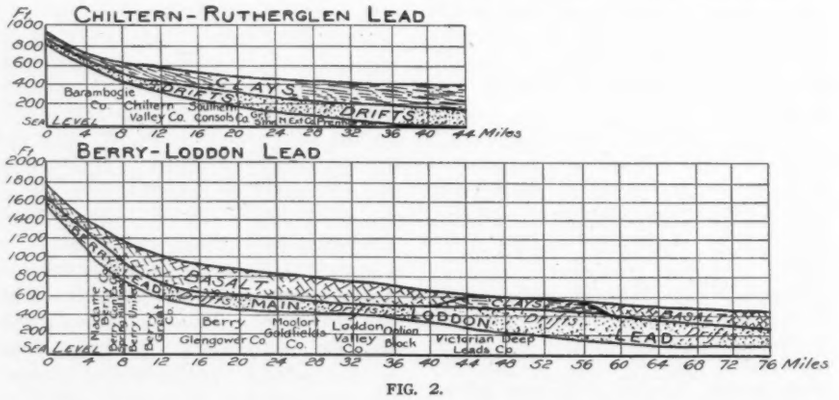

FIG. 2.

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on belts where there is no evidence of well defined and continuous reefs in the neighborhood, but still auriferous quartz, occuring even as mere stringers, has had the effect of enriching the gravels in the vicinity of the belts as compared with other portions of the lead on the auriferous zones.

The effect of enriching belts is of the highest importance in determining the probably rich portions of a lead before any expense in exploratory work is incurred, as the persistence of the belts is most reliable. The presence of rich alluvium has been marked not only on all tributaries of the Loddon lead system, but even in the leads about Pitfield, which is on the southern watershed; the fact that such well known alluvial mining fields as Inglewood, Tarnagulla, Majorca, Clunes and Pitfield are located in a straight line is sufficient proof of the existence of rich alluvium along a continuous belt. As showing the enriching effects on a lead crossing a series of auriferous belts, the Mt. Greenock lead (Fig. 3) is a good example; this lead, with its tributaries (though on an auriferous zone) has been profitably worked only at Talbot and Majorca where it crosses the auriferous belts.

At these places the lead ran 1 or 2 oz. per sq. fathom of bottom for a considerable length; many dividends were paid by such mines, as the Kong Ming and Napiers Freehold, but although the deep lead has been prospected between these two fields in many places, yet nowhere else has it proved profitable. The very local enriching effect of particular reefs is to be seen in many cases where a lead runs at right angles to the strike of reefs. On the Burnt Creek lead, for instance, a mine has a lead some 700 ft. wide, and a "pay streak" running through it about 200 ft. wide, the rest being worth perhaps 2 or 3 dwt. per fathom; yet whereever a reef has been crossed by a lead for a few yards below this reef the whole 700 ft. of wash was payable (10 to 15 dwt. per sq. fathom).

Summing up the influences of external conditions on the value of the lead gravels it may be said, that those leads on the non-auriferous zones must necessarily be barren or practically so; and that regarding the leads on the auriferous zones (though the lead as a whole will contain gold on and in proximity to the auriferous belts) yet it is only where the transported gold has been supplemented by the local gold derived from quartz reefs that profitable wash can be relied on.

Having dealt with the primary or external conditions affecting the value of alluvial deposits, it is now necessary to discuss the effect of the local physical conditions under which the auriferous gravels were laid down, and the nature of the results which these conditions have had on the concentration of what may be termed "the bed of the lead." These conditions are of purely local importance in affecting short sections which have general relations similar to the primary source of all their gold (namely, the auriferous quartz reefs) and to the nature of the bed rock on which the gravels lie.

Gold, as obtained from the two or three feet of gravel removed in deep-lead mining, is of two characters, local and transported. It is almost unnecessary to say that the gold of local origin is derived from reefs in the immediate vicinity; and, judging by the short distance from the reef that coarse gold is carried in leads of a low gradient, it may be assumed that

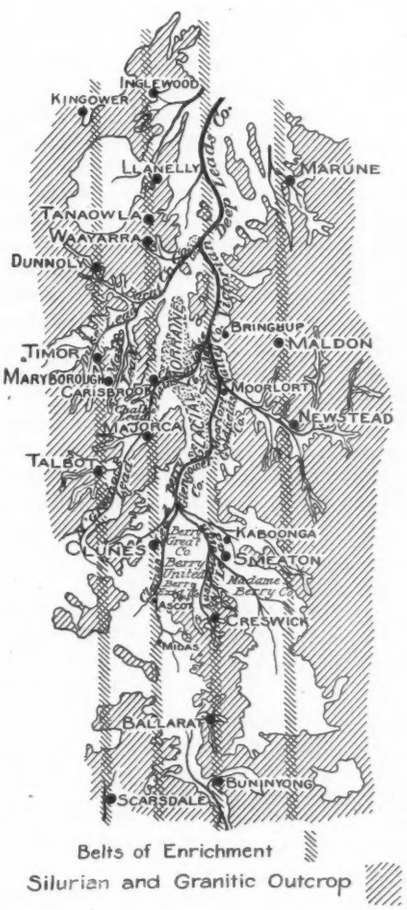


FIG. 3.

the enriching effect of coarse local gold is limited to a few hundred yards of the reef from which it has been derived.

But necessarily the line of distinction between "local" and "transported" gold is one that cannot be sharply drawn. The gage of the transported gold is determined by the maximum velocity of the water at the place where it was deposited; necessarily the gage of "transported" gold at one point of a lead becomes equal to that of "local" gold at another; the distinction between the two classes of gold is only apparent where the alluvial deposit is in close proximity to auriferous reefs, or where a tributary with a higher gradient joins the main lead.

Effect of Gradient of a Lead Bed.—This is considered as determining the velocity of the transporting, depositing and concentrating streams that laid down the alluvial deposit. Owing to the great disturbance in the levels of leads since they were laid down, it is impossible to say what was the gradient of the old river (when the majority of the gold was finally deposited) in the few feet of gravel on the bedrock; it is the value of this that is under consideration.

However, the longitudinal profiles of many leads in Victoria are undisturbed; where the rocks on which they lie are homogeneous, this profile is not far removed from the curve of "quickest descent." The transporting power of water is said to vary as the sixth power of the velocity. As the velocity of a stream varies with the steepness of its longitudinal profile, the gage of transported gold is influenced by the gradient of the lead bed; hence the immense quantities of gold that are too fine to be deposited in the upper reaches of a lead, will be found where the depositing stream had a gradient of only 5 or 10 ft. to the mile.

Fig. 2 gives the longitudinal profiles of the two principal lead systems that have been worked in Victoria. The Loddon lead shows several disturbances in levels due to earth movements of a date subsequent to their formation.

The following figures will give an approximate idea of the gage of the gold at various points.

Mine.	Gradient of Lead, Ft. per Mile.	Approx. Width of Lead, Ft.	No. of Particles of Gold per Gramme.
Chiltern-Rutherglen lead:			
Chiltern Valley Gold Mine.....	29	550	550
Great Southern G. M. Co.....	13	800	850
Prentice & Southern G. M. Co..	11½	800	1,040
Loddon lead:			
West Berry Consols Co.....	80	300	430
Madame Berry W Co.....	70	700	500
Berry Consols Extd. Co.....	60	700	758
Spring Hill & Central Leads Co.	40	700	1 500

Cross Profile of a Lead Channel.—This considers the effect of the width of the bed of wash on its value. The river systems that deposited and formed the gravels now worked as deep leads (with the exception of their upper reaches) long since reached their base level of corrosion and consequently their cross profile had the shape of a wide flat pan. The bed containing the wash is level where inequalities in hardness of the bedrock (where a lead is crossing the stratification) cause "pot holes" and ridges and consequently the wash is irregular in quality; the pot holes are invariably barren and merely contain sand.

In the upper reaches of the leads the cross profile is more V-shaped. Everywhere the leads point to rivers of great

age; the wash and mineral contents are the result of numerous reconcentrations owing to the shifting of the main watercourse from one side of a partially silted up valley to the other. It is owing to this fact that a lead is not of uniform value for its full width, but shows one or more "runs" or "pay streaks"; these contain gold in greater quantities than other portions of the wash which have little value. No systematic deductions can be made as regards the position of these "pay streaks" in the leads whose beds of wash are many times wider than the streams that actually deposited them and that concentrated their mineral contents.

It is by no means the rule that the portion of a lead that is deepest is the side that contains the "pay streak"; from observations at many alluvial mines in Victoria, the only conclusions that can be arrived at are: that the position of the pay streak is, either that of the last stream which actually had the bedrock as its bed, or of that stream which had the most stationary bed. This latter stream would naturally concentrate from the greatest amount of accumulated gravels.

At bends of a lead, the "pay streak" is generally to be found on the *convex* side of the bend in leads of steep gradient (over 25 ft. per mile); and on the *concave* side in leads of flat gradient.

Effect in Variation in Width of Wash on Its Value.—The difference in "width of wash" of a lead is primarily caused by inequalities in the hardness of the bedrock. Some examples show that: a lead, with a low gradient (14 ft. per mile), and with a wide bed of wash (800 ft.) was for a short length constricted by a very hard bar of rock to a width of 200 ft.; this was caused by the sides rising abruptly on either edge. The wash of this section was found to contain little or no gold (what there was being course, perhaps with an average of 2 dwt. per fathom). To the north and south, the wash widened out to nearly 900 ft.; for the full width and for a considerable length, it has yielded 14 to 18 dwt. of gold per sq. fathom. This is a clear case of the increased velocity of the water (owing to the narrow channel) preventing the deposition of transported gold on which the wash of this mine relied for value. Higher up the same lead at another mine, where the gradient was much steeper, the wash widened out to over 1,200 ft.; but of this width a "pay streak" of only 160 feet was found.

Another lead with a longitudinal gradient of over 50 ft. per mile (the wash of which depended on local gold for value) had an average width of 300 ft.; for a length of three-quarters of a mile it widened to 700 ft.; here, although the gradient remained the same, this section was found to be unpayable, while above and below it was highly remunerative. This is a case where the local gold (of which it can be assumed there was a constant supply per mile of lead and on which the gravels entirely depended for value) was distributed over a wider area of wash, with a consequent impoverishment per average fathom.

Value of Wash at the Junction of Two Leads.—As a function of width and longitudinal gradient of a lead, the difference in value of the wash in leads above and below the junction is interesting.

Considering *local* gold, let us assume a constant supply of gold from auriferous quartz veins throughout the length of lead. The width of wash *at, and immediately below,* the junction of two leads bears a smaller ratio to the width of denuded country, than it does either up or down the stream from this point; hence the increase in local gold (per sq. fathom of wash) is generally observed at the junction of two leads. Considering *transported* gold: Immediately below the junction of two rivers of equal size, the velocity of the running water is generally less than in either of them separately; consequently gold that has just been transported in the tributaries will be deposited at and below a junction; the quantity will be in proportion to the decrease in the velocity of the depositing water in time of maximum flow at the portion of the lead in question.

In the case of a steep-gradient tributary joining a low gradient-main lead (in which the original flow was at a much lower velocity), there is always found to be an enrichment below the junction, and the gauge of the transported gold of the main lead is greatly increased.

The famous Madame Berry mine owed its richness, partly to the fact that several rich leads junctioned in the property; but the presence of auriferous quartz reefs was the determining factor in this case.

The foregoing principles of gold derivation, concentration, and deposition will be of assistance in summing up a deep-lead proposition, both before and after it has been sampled by prospecting bores.

The method of producing the jump spark (which is used extensively with those types of gas-engine of variable speed) differs from the touch spark, in that a secondary or fine wire coil is wound around the inductive resistance, which upon making and breaking the circuit, will generate a momentary current of high voltage (sometimes termed an "inductive kick") in this fine wire coil, the ends of which are connected to stationary points, or electrodes, on the spark plug screwed into the combustion chamber of the engine.

The efficiency of the induction furnace is high. Kjellin reaches a measure of 48.05 efficiency; and other furnaces have gone beyond that in actual operation.

A Colliery-Waste Conveyor.

BY R. A. HENRY.

The conveyor and dump used in forming the conical waste heap at the Nicheroux mine of the Hasard colliery, near Liège, Belgium, present certain special features.

The installation comprises a system of chain haulage, by means of which the loaded waste cars are brought to the base of the heap. Just before the end of the track is reached, the cars are detached from the chain and run down by gravity to a dump, which discharges their contents into a 100-ton hopper, from which the waste heap trucks are filled. The empty cars run round to the return track of the chain haulage and are hooked on to the chain automatically. The chain runs at a velocity of 100 ft. per min.; the waste cars are hooked on at intervals of about 33 ft.; and, as 180 cars are discharged per hour, each of which contains about 14 cwt. of waste, the total capacity of the system is 126 tons per hour.

The dump wagons, carrying the waste up to the summit of the cone, are hauled up by 1-in. wire ropes worked by an electric winch, mounted some little distance out of the direct line of the conveyor track, so as to be out of danger if the rope should break. The 2,000-volt, 65-h.p. triphase motor is connected to the drums by gear, reducing the speed to 1-25th, so that the rope runs at a velocity of 200 ft. per minute.

The relatively slow rope speed of 200 ft. per min. was adopted for the following reasons: The problem was that of delivering 100 tons of waste per hour to the summit of a constantly increasing cone, until the heap should contain about 2,000,000 tons. To meet these conditions, large tip wagons are used that may be rapidly loaded and discharged; and these are run at the slow rate specified in order to ensure safety in working, since rapid starting and stopping are the most fertile sources of rope breakage.

The dump cars are 3 ft. high in the body, 11½ ft. long, 4 ft. wide, and have a maximum capacity of 6¼ tons of waste, the usual load, however, being 5 tons. The smaller front wheels run on a 52-in. track, while the larger hind wheels run on a track of 6 ft. gauge. Hence, as the cars reach the top of the cone, where the narrow-gauge track is laid at a gradient different from the other, they are dumped, similarly to "gunboats" at Pennsylvania anthracite mines. The cars can also be discharged through side doors by raising the bed of the inclined track. For this latter purpose the two sets of rails are lifted by jacks.

The maximum length of the incline, when the cone attains its full size, will be 560 ft., and as the time consumed in each trip of the cars (including the loading and tipping) is only 3 min., the 20 trips per hour give a full effective capacity of 100 tons.

Testing High Power Gas Engines.*

BY WILLIAM H. SPILLER.

The modern gas engine has to undergo prolonged and severe tests in the factory, far more critical than the majority of steam engines ever pass through. The duration of these tests varies from a week to 15 days, according to the size of the engine, the work it has to perform and the distance it will require to be shipped.

As engines are usually sold under a positive guarantee covering consumption of fuel per h. p., workmanship, material and general efficiency under actual operative conditions, the reason for the exhaustive testing is at once apparent; the manufacturer cannot afford to run any risk of a shut down after installation.

The first tests are made by the chemist when he analyzes the raw materials, and this analysis must tally with the specifications calling for the particular grade required for certain parts of the machine; the physical tests follow. After the cylinders have been finished, and before assembling the engine, they are tested under hydraulic pressure with a special device, and the pressure, number of the cylinder and engine recorded.

The various materials and parts of the engine, having passed these preliminary but systematic tests, and then being assembled, to form the completed engine, the cams and gears are set correctly for the proper timing and igniting of the gases in the cylinders, the valves are set, and the engine is ready for its initial run. Indicator cards are taken from each cylinder.

The large engines are started by compressed air, admitted through an automatic starting valve to one cylinder, and the engine operates by this means until gas has been drawn into the other cylinder, compressed and ignited, and then upon shutting off the compressed air and admitting gas to the first cylinder it immediately assumes its cycle of operations upon gas. The compressed air is supplied by a small gas engine-driven air compressor.

The indicator cards taken show compression in lb. per sq. in. of the mixture of gas and air, the pressure of the gases after ignition, the pressure of the exhaust, and whether the intake and exhaust valves are set properly, and whether the ignitors are accurately timed.

The valves on large engines are operated positively by mechanical means and as they are provided with a device for fine adjustment an excellent opportunity is afforded for securing high efficiency and economy.

The brake test is most important; it is usually made by means of a dynamometer of the Prony brake type.

The dynamometer consists of a large cast iron ring, having both inwardly and outwardly projecting flanges, the inner flanges serving as a trough to hold the water necessary to keep down and absorb the heat developed when the engine is delivering a great amount of power. A small pipe standing at the proper height allows the water to flow into the ring, thus maintaining a constant amount of water to supply the loss from rapid evaporation. The heat is partially dissipated in the form of steam, and the excess of water is carried away by means of an overflow pipe. The outer flange on the ring serves to hold in position the brake strap of steel to which shoes of wood are riveted; this strap is provided with two hand wheels at the back for tightening and increasing the friction on the ring or drum. Lubrication is supplied from pieces of tallow placed between the blocks of wood. The drum is bolted to the fly-wheel and revolves with it; the brake arm resting upon a knife edge on top of the wooden stand on the platform scales prevents the brake from revolving when the strap is tightened, and allows the downward push to be measured on the scale.

In operation, the engine is run at normal speed and the strap is tightened until the speed of engine remains constant and carries the proper load, as indicated by the weight necessary to balance the scale. The length of the arm is taken as the distance from the center of the engine shaft to the knife edge on top of the wooden stand on the scale; and the weight of the brake arm and wooden stand is deducted from the total weight as registered by the scale.

*Abstract of a paper read before the Technological Society of Kansas City, Mo., Dec. 7, 1905.

Rock drills should not be started at full stroke on a slanting rock, for there is danger of breaking the steel, if not bending the piston rod; chip off the rock until there is a square surface for the drill to strike. If using a column, put a piece of planking about 3 or 4 in. thick at each end; never connect the hose with a drill without first blowing a little steam or air through it to remove any dirt or scales from the pipe which might have lodged in it.

Care should be taken during hot weather to prevent the rapid drying of concrete. It should be protected from the sun and occasionally sprinkled with water; it is a good plan to cover the smaller masses with a wet cloth.

A gas- or gasoline-engine must take in the proper explosive mixture, properly compress it, fire it at the right time, properly exhaust the burned gases and carry off the surplus heat. Derangement of any one of these functions is apt to cause the complete stoppage of the machine.

The "Page effect" in the induction furnace gives no perceptible over-tones. In some furnaces recently worked with the note is about the middle C of the pianoforte.

A New Turbo-Generator Installation.

A party of engineers and professional men were entertained by what may be termed a "private view" of the 5,500 k.w. Allis-Chalmers turbo-generator at the Kent avenue power station of the Brooklyn Rapid Transit Company on Dec. 12. The set shown is mounted next to a Westinghouse-Parsons machine, and very similar to it in general, though with many differences in detail. Both Westinghouse and Allis-Chalmers machines are of the Parson's type.

The machine is three-stage and is the first made in the Allis-Chalmers shops. The details differ slightly from those of the Utica turbine lately described in this JOURNAL (Dec. 16, 1905, p. 1118). The shroud ring reinforcement at the tips of the blades is continuous for most sets of blading, but where the change of stage is made the near rings are diagonally cut to provide for expansion. The channel section is used on this as well as the Utica machine; its principal value, aside from its structural strength, lies in the minute clearance that is needed, compared with a form of blading that has no outer support.

The blading is of "Nickel-copper," an alloy made for the special purpose. It has the appearance of brass before use, but after running under steam pressure becomes a light steely yellow, somewhat like polished steel that has been laquered.

The most apparent difference, aside from the blading, between this machine and the older forms, is the saving in the floor space occupied effected by the new method of balancing the thrust. The balance piston is much smaller than in the usual form of Parsons turbine, this end being attained by providing a reverse flow of the steam through the interior casing or spider upon which the blading is mounted. The low pressure steam impinges here upon a set of radially disposed baffles which give a counterbalancing effect, and enable the thrust bearings to be materially reduced in size.

The turbine is to be direct connected to a Bullock 5,500 k. w. 3 phase generator furnishing 6,600 volts at 25 cycles. The set is mounted directly over its own surface condenser of the Worthington type.

The coefficient of expansion of concrete, of the proportions 1 : 2 : 4, by heat, has been determined as 0.0000055 for 1° F., which is almost the same as that of untempered steel, which is 0.0000060.

In rope transmission special care should be taken that the sheaves be well balanced, as the centrifugal force is great. They should be fitted true on the shaft, and the shaft set at right angles to the line of transmission. If the sheaves wabble and run out of line they will cause the rope to vibrate and jerk.

Magnetic Separation of Pyrrhotite and Chalcopyrite.

John N. Judson, of South Strafford, Vt., has described an improved method of separating pyrrhotite from chalcopyrite and gangue. (U. S. patent No. 801,879, Oct. 17, 1905.)

Pyrrhotite is usually so highly magnetic that it can be removed from most ores containing it without difficulty by the aid of almost any kind of a magnetic separator. Certain kinds of pyrrhotite, however, are practically non-magnetic or so weakly magnetic as to be incapable of attraction in their native condition by any of the usual types of magnetic separators. For instance at Copperfield and at South Strafford, Vt., and at certain places in Virginia the pyrrhotite contained in the ore deposits is so weakly magnetic that while it can possibly be removed to some degree by the most powerful magnets employed in separators of the kind known commercially as the "Rowland type E," it is at so slow a rate that the commercial employment of such a separator is out of the question.

In investigating experimentally the treatment of these complex ores for the purpose of separating the non-magnetic or weakly-magnetic pyrrhotite therefrom it was discovered that if the ores be crushed to the proper degree of fineness—say to a size sufficient to pass through a No. 10 screen or finer size—and are then heated slightly each particle of pyrrhotite acquires a bornite-like iridescence or surface film of rainbow colors (probably due to an incipient oxidation on the surface) and that the particles then become much more permeable to the magnetic lines of force, and consequently more readily susceptible to magnetic attraction. For instance, (where such pyrrhotite could not be removed by a Rowland two-magnet separator of the E type, excited by 45 amperes of current, at a rate to exceed 300 to 400 lb. per hour,) after receiving the surface film referred to, a single Rowland magnet of the same construction excited with a current of six amperes would treat the same ore at the rate of two tons per hour, making an excellent separation. The same separator excited by the same amount of current would not remove the pyrrhotite from crude or untarnished ore.

The range of temperatures through which the changes indicated may be effected is considerable, but, nevertheless, limited. The ore must not be allowed to reach a red heat, for that would render the chalcopyrite magnetic also, and, on the other hand, it should, at the lower limits incident to successful practice, be rather too hot to hold in the hand. Only a faint odor of sulphur dioxide is noticeable during the operation.

In the separation of the pyrrhotite from the chalcopyrite of the ores at the Elizabeth mine, South Strafford, Vt., the ore is first roughly crushed by a Blake breaker and then further reduced by rolls to pieces of about 5/8 in. size. This crushed ore is then heated in a suitable furnace to the degree necessary to render the outer surface of each piece of pyrrhotite magnetic. The ore is then removed from the furnace and is delivered upon a 10-mesh screen. The portion which passes through the screen is sent to the magnetic separator for the removal of the pyrrhotite now rendered magnetic. The oversize is there crushed so as to pass through a 10-mesh screen and is returned to the heating-furnace, so as to insure that the pyrrhotite in the interior of the oversize lumps shall be ultimately rendered magnetic. From the furnace such retreated material again passes through the screen and to the magnetic separators for the removal of the pyrrhotite. The residue remaining after the pyrrhotite has been removed by the magnetic separators is roasted, for the oxidation of the iron of the chalcopyrite and other-sulphur minerals present, in any suitable roasting-furnace, and after cooling the roasted material is itself passed through magnetic separators and the roasted chalcopyrite removed.

A Method for the Determination of Fluorine in an Ore or Slag.

BY E. KNEELAND.*

In presenting this method I have endeavored to simplify an old Fresenius method and render it adaptable for use in the ordinary run of smelter laboratories. Although at first sight it seems a little intricate, the reactions are very simple and with a little practice the chemist will be able to run several of these determinations through in a day, together with his customary other work without giving himself much extra trouble.

The method is as follows: Fuse 0.5 or 1 gram of the material (according to the supposed amount of flourine present) in a porcelain crucible with 10 times its weight of a mixture of equal parts of carbonate of soda and carbonate of potash, until the whole mass is in quiet fusion. Raise the heat to bright red and pour into an iron mold, saving the crucible. Cool, break up the crucible into small pieces and transfer along with the fused mass to a 6 in. agate ware casserole (agate ware is preferable to porcelain to avoid subsequent "bumping"). Add 200 cc. of distilled water and digest for one hour at a temperature near the boiling point, breaking up the fused lump with a thick glass rod. If at the end of this time any undecomposed lumps are noticed, remove them with pincers and grind in an agate mortar and wash back into the casserole with hot water.

*Chemist, Torreon, Coah, Mexico.

Now boil for 10 minutes and filter through a loose filter into a beaker of about one liter capacity. Wash first with hot water, then with a hot solution of ammonium carbonate. The residue is now discarded. Add to the filtrate 10 grams of ammonium carbonate and boil five minutes, and afterwards allow to stand in the cold for two hours. Filter through a loose filter into a 6-in. agate ware casserole (decanting as much as possible of the fluid) and wash with cold water once or twice. Now to eliminate final traces of silica add 20 cc. of an emulsion of zinc oxide in ammonia and boil, leaving the casserole uncovered, until no more odor of ammonia is detected.

Filter into a No. 5 beaker and wash with hot water. To the filtrate add a solution of calcium chloride stirring the while with a rubber tipped glass rod, until no more precipitate is formed. Allow the precipitate to subside, and filter, washing with hot water. Test the filtrate for carbonates and fluorine with a few drops of the calcium chloride solution. Now transfer the precipitate along with the filter paper to a platinum dish of suitable size. Dry first, then ignite at a red heat for 20 minutes. Cool and disintegrate the mass with hot water. Add acetic acid until the solution is clear and evaporate to dryness being careful not to scorch. Now moisten again with acetic acid and evaporate until there is no more perceptible odor of acetic acid.

Wash the mass into a No. 3 beaker with hot water, adding hot water until the lime acetate is all dissolved and finally 150 cc. excess of hot water and stir. Digest for a few minutes in a warm place on the hot plate and filter, washing first with hot water then with hot ammonium chloride solution, and again with hot water. Transfer the precipitate along with the filter paper to a platinum dish, dry and ignite. Cool, moisten with cold water, add 6 cc. of strong sulphuric acid, and heat for a few minutes. Cool, add 3 cc. of hydrochloric acid, heat for a few minutes. Cool, dilute and transfer the contents of the dish to a No. 2 beaker. Add five grams of ammonium chloride, boil for a few minutes, cool and add an excess of strong ammonia water. All 2 or 3 cc. of strong peroxide of hydrogen solution, boil and filter. The lime is then precipitated from the filtrate with ammonium oxalate and the amount determined as CaO, in the usual manner by titration with the permanganate solution. Calculate the CaO to CaF_2, from which the amount of fluorine can be readily calculated.

To calculate CaO to CaF_2 multiply the percentage of CaO found by 1.392. Multiply the percentage of CaF_2 found by .4872 which will give the percentage of fluorine.

Belting should never be kept in a hot dry place, but rather in a *cool* dry place.

The Sahuayacan Mining District, Mexico.

BY JOHN C. TREADWELL.†

The Sahuayacan Mining District is comparatively new; it is located in the State of Chihuahua, about 250 miles west of the city of Chihuahua, and 125 miles from Minaca, which is the nearest railway station and from which point all traffic, passenger as well as freight, is carried on mule back. Freight requires from 12 to 20 days, while a passenger can make the journey in 4 or 5 days. A telegraph line reaches as far as Ocampo, whence a telephone service is in operation to Santa Teresa and Sahuayacan.

The route from Minaca to Sahuayacan leads through the mining town of Jesus Maria (Ocampo). This place is about 100 years old and has produced many millions of silver from its several large mines; they are now, however, for the most part dormant, only two mines being in operation. From Ocampa westward, the comtry is much broken and is characterized by precipitous mountain slopes and deep gulches; with evidence of great erosion, extending over long periods of time, and shown in a striking way. Sahuayacan lies in a cañon which presents a typical example of erosion.

†Manager, Sahuayacan Mining Co., Ocampo, Chihuahua, Mexico.

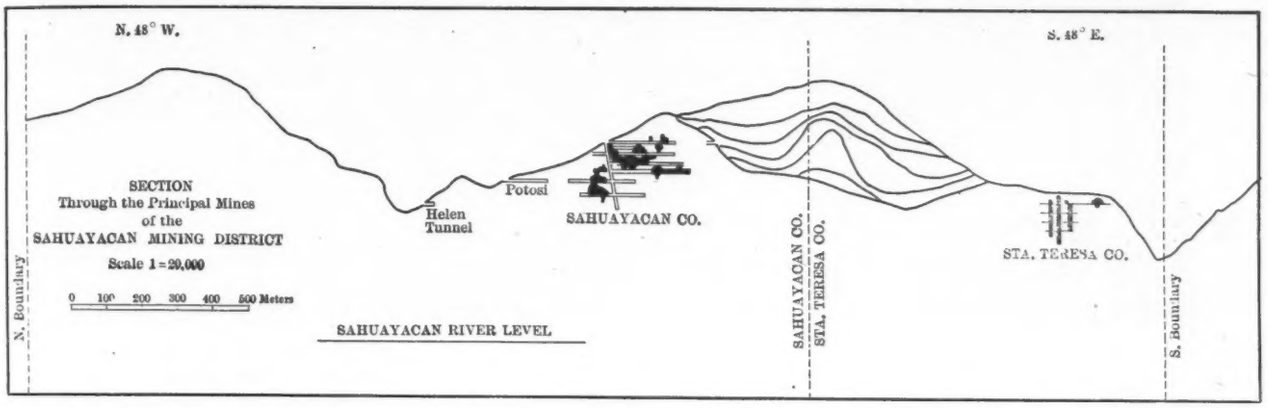
The differences in elevation vary between 2,000 ft. at the river levels, to 4,000 or 6,000 ft. at the peaks and table lands. Along the low valleys the climate may be considered tropical, producing bananas, oranges, lemons, etc.; frost is unknown. At elevations of above 4,000 ft. snow falls at times, but never with the heavy freezing of higher altitudes.

Precipitation is confined principally to the months of July, August and September; during that time the rain descends in torrents, the streams swell sweeping debris from the mountain side with irresistible force. During those three months the hillsides become covered with verdure and heavy undergrowth, which in turn dies down and is washed away by succeeding rains, exposing the formations and thus admitting of easy prospecting. The temperature for nine months of the year is delightful, averaging, perhaps, 75° F., while during the remaining three months the climate is hot in the day time, though always pleasant at night, with an average temperature of probably 85° F.

The mountain tops in the district, as also the whole northern portion of the Sierra Madres, from the western foot hills to and including the great Mexican plateau, are composed for the most part of a tuff (locally known as *cantera*). Locally this capping might be termed a dacitic andesite, being often finely brecciated and carrying quartz in stringers and veinlets.

In the Sahuayacan-Moris vicinity the country has been capped by a true conglomorate, which, according to Bagg,[1] is of volcanic origin, the component parts include boulders of large size. At Sahuayacan this capping has been almost entirely removed by faulting and erosion, but at Moris much of the conglomerate still exists as capping, though much faulted and tilted.

The recent geology of the district may be partially summarized as follows:



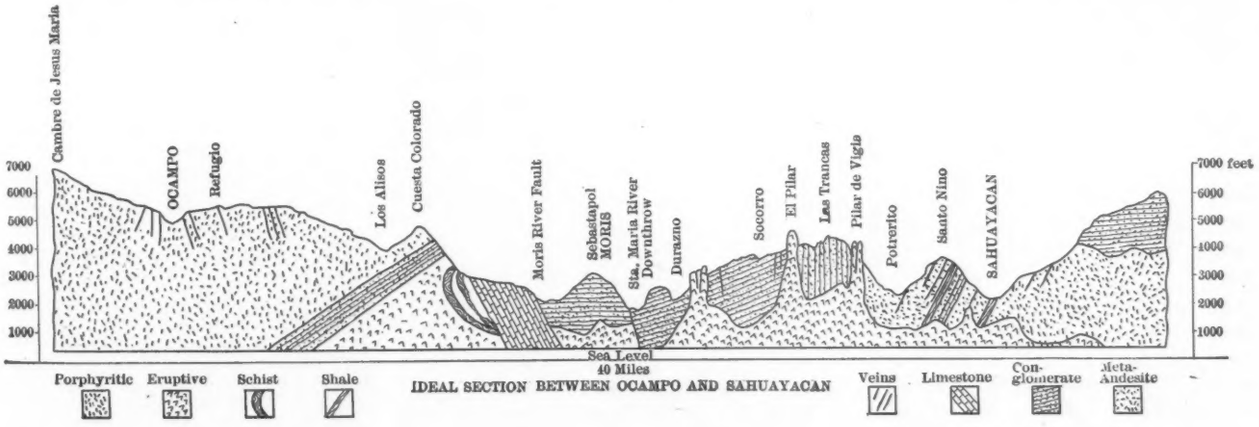
1. Shale, deposition as mud and clay, with compression.

2. Volcanic breccia, which by alteration produces the "green stone" (or meta-andesite).

3. (*a*) Tilting and crumpling of these formations; (b) intrusion of rhyolite, faulting and (*c*) formation of veins.

4. Capping of conglomerate.

5. Erosion, exposing the older tilted rocks, and laying bare the veins.



The shale occurs as a narrow band, tilted to the north-east, at about 56° from the vertical, and striking with the general trend of the country at about north-west and south-east. On the surface it is much altered; it is traced by a band of red, which distinctly marks its course. It is impregnated with pyrite, which, when clean, carries values to the amount of $200 Mexican. Aside from this impregnation of pyrite, ore has never been uncovered in

[1] This JOURNAL, Apr. 20, 1905, p. 749.

the shale. However, it plays an important part in the inquiry as to the origin of the ore. Lime in small amount accompanies the shale, which is undoubtedly a member of the "marine sedimentary series" referred to by Hill.[2]

The andesite occupies a position to the north-east of, and conformable both in pitch and strike to, the shale. This rock exhibits joint-planes lying at an angle of about 45° to the strike of the country; they are probably attributable to the intrusion of a large porphyritic dyke which lies more or less parallel with the shale but removed from it about 2,000 ft. to the east. To the intrusion of this dyke may be atributed the fissuring and metamorphism which initiated the veins of the district.

In connection with the mention of this dyke, and as having some influence on vein formation, it is well to note the presence of numerous buttes which occur throughout the district in the form of immense columns of rhyolite; prominent among them are two examples; one at El Pilar, and its companion, Pilar de Vigia, at La Cienega. The "Pilar" is noted for its symmetry; it is nearly circular in section, about 400 ft. in diam, and rises to a height of 600 ft. above the surrounding country.

Various modes of formation have been proposed for these columns, none of which seem to be conclusive. One theory advanced is that they are the filling of ancient volcanic vents, which resisted the action of the elements. As a partial proof of this hypothesis is the presence of volcanic ash around the base of the Pilar, as noted by Bagg.

The andesite which lies in close proximity to the veins has become altered, and is generally impregnated with pyrite. Some tests have been made with the object of determining the possible value of this pyrite. In the Sahuayacan mine, a cross-cut 200 ft. long in the "green stone" was sampled every few feet and concentration tests were made. The results showed that with a concentration of 1000 to 1, a product assaying $100 per ton Mexican in gold and silver (equally divided) could be produced. These conclusions, while economically valueless, present an inviting theme for speculation on the ore deposition of the vein proper.

The veins of the district are numerous, well defined and probably extend to great depths. They may be classified in two classes, those above average free-milling and those producing refractory ore.

The more valuable mines occur in the veins of the first (free-milling) class; these are the only ones that are being extensively exploited at present. The veins occur in "greenstone" (andesite), as contact with shale as a foot wall, and as fissure veins in the "greenstone" proper. The free-milling ores carry varying amounts of gold and silver; in some cases, as at the Sahuayacan mine, the gold predominates, the silver being very low.

[2] This JOURNAL, Mar. 2, 1905, p. 410.

COST OF DRIFTING IN THE SAHUAYACAN MINE.

LABOR.

	Breaking.				Hoisting and Pumping.			Outside.				Superintendence.	Total Labor.
	Drilling.	Laborers Inside.	Timbering.	Total Inside.	Hoist.	Pumps.	Total.	Blacksmithing.	Sampling.	Labor Outside.	Total Outside.		
Totals	3,372.48	283.50	126.35	3,782.33	197.50	93.00	290.50	119.00	66.00	298.50	483.50	528.75	5,085.08
Cost per ft.	10.04	.84	.38	11.26	.59	.27	.86	.35	.20	.89	1.44	1.57	15.13

SUPPLIES.

	Powder.	Fuse.	Caps.	Candles.	Steel.	Wood.	Oils and Packing.	Charcoal.	Illuminating.	Lumber.	Pipes and Fittings.	Sundries.	Total Supplies.
Totals	360.60	57.73	18.80	155.00	8.63	159.50	23.75	16.95	7.35	13.55	31.65	50.02	903.53
Cost per ft.	1.07	.17	.06	.46	.03	.48	.07	.05	.02	.04	.09	.15	2.69

OPERATING COSTS AT SAHUAYACAN IN MEXICAN CURRENCY, COVERING A PERIOD OF EIGHT MONTHS.

Prospecting and Development.	Ore Account.	Shaft.	Tramway.	Milling.	Assaying.	Office Expenses and Administration.	Taxes.	Bullion Expense.	Shipping Concentrate.	General Expense.	Total Cost per Ton.
2.75	2.42	.27	.34	4.67	.11	.65	.13	1.15	.12	.67	13.28

The ore contained in the veins of the second (refractory) class are largely antimonial; they carry their principal value in silver, to the almost absolute exclusion of gold. On account of the difficulties of treatment, there are no large mines in the refractory belt; but work is carried on in a desultory manner by the native miners or *Gambucinos,* who treat the ore in Mexican *vasos,* a wasteful and unsatisfactory method.

The principal mine in the district is the Santo Niño, the property of the Sahuayacan Mining Co.; this has attained a depth (by an inclined shaft) of 600 ft., with a lateral extension along the vein of 1,300 ft.

Next in importance is the Santa Teresa mine at El Potrerito. This mine is 250 ft. deep, with levels every 50 ft. Little stoping has been done, the obvious intent of the owners being to develop the property for sale. They have on the ground a ten-stamp mill, employing pans and settlers, with Wilfley concentrators handling the tailing. They have extracted with this mill $300,000 Mexican, and are said to have 25,000 tons of $40 ore "blocked out and in sight." They employ at the mine and mill 70 men. The vein is a well defined contact vein, with shale as a foot-and "greenstone" as a hanging-wall. The vein is about 20 ft. wide, the pay streak averaging probably 7 ft., and lying close to the hanging wall. The major portion of the values extracted are in gold, the bullion assaying about .120 gold and, say, .840 in silver. The gold is free and could be easily caught on copper plates. The silver occurs principally as sulphide; at times, beautiful specimens of ruby silver are encountered. The distance between the shafts of these two mines is something less than a mile, the Santa Teresa lying about 500 ft. lower than the Santo Niño.

At El Socorro, seven miles to the south-east of Sahuayacan, the Templar has been worked steadily on a small scale for five or six years. The vein is a "true fissure," varying from a few inches to four feet in width, and standing almost vertical. This mine is noted for the rich specimens of free and crystallized gold which it produces; with careful management it would make a good producer. There is on the ground a 10-stamp mill with pans, settlers and concentrators.

The San Antonio, which is distant from Sahuayacan about three miles, has in the past produced some rich silver ore, but is at present practically abandoned, although still containing small amounts of rich antimonial and sulphide silver ores.

The Candelaria at El Carmen is about 12 miles distant and is also an old property. Lately there has been some rich sulphide ore taken from there; but, like the San Antonio, it is at present inoperative. It is the general opinion that this is an excellent mine.

About three miles south of Sahuayacan, some stringers of galena have been located, which have proven of value in treating the rich but rebellious silver ores of the vicinity.

Nine hours' ride to the south is located the Otates silver mine; while not in the Sahuayacan district proper, yet it deserves passing mention. The mine has been worked on a small scale for 20 years. At present the ore is treated by means of a five-stamp mill, then roasting and subjecting to hyposulphite lixiviation.

This property has lately been shipping ore which assays 500 or 600 oz. silver per ton. Some beautiful specimens of native silver have lately been exhibited from there.

About six hours to the south-west there are some narrow silver veins which have not been exploited, as they are antimonial and therefore difficult to treat.

The minerals encountered in this district are as follows:

Gold.—Native, with galena, with pyrite, as petzite, and as nagyagite; the latter two in small amount.

Silver.—Native, argentine, pyrargyrite, with galena, with pyrite, with chalcopyrite.

Lead.—As galena (unimportant), fine grained galena in the gold veins is an invariable indication of rich ore.

Copper.—In the gold veins, native as small shot, chalcopyrite, etc, in small amount.

Bismuth.—In minute traces, with galena.

Antimony.—In veins as stibnite and cervantite, in veins barren of precious metals; as impurity in the gold and silver veins.

Iron—As pyrite, carrying (in the veins) the meta-andesite in close proximity to the valuable amounts of gold and silver. In veins, the contained pyrite can be concentrated to $100 Mexican per ton..

Manganese—As a loose black powder, probably wad, not valuable as ore, but considered a good indication of high gold value in the vein.

Considering the remoteness of the district expenses of operation are comparatively light, as will be evidenced by a glance at the cost sheets given herewith; these may be considered as representative of the work done by the Sahuayacan Mining Co. This concern operates the Santo Niño mine treating the ore in a 20-stamp amalgamation mill. The mine is operated by means of an incline, and ore is hoisted by a single drum, 50-h. p., sectional hoisting engine and a one-ton self-dumping skip. The ore bodies are developed by means of levels and raises. Chutes are placed about 30 ft. apart in the levels, and overhand stoping is almost exclusively employed. The broken ore is allowed to accumulate in the chutes, only the surplus being drawn off, thus allowing the miners to work on top of the ore. This method is employed as the most economical in timber, which is not abundant and is costly.

The vein is ordinarily 20 ft. wide, but in places expands to 60 ft. The whole body of the vein is mineralized, and will assay from $1 to $7 per ton. Constant sampling is necessary, and is carried on with a great deal of care. Each face is carefully sampled every day, and in such a manner that each distinct streak will be

SAHUAYACAN MILL.

SANTO NINO HOIST AND ORE BIN.

"EL PILAR."

A 2,000 FT. "CANTERA" CLIFF.

The latest strike in the district is at El Sauz, about 10 miles to the west; there a vein of rich sulphide silver ore was discovered dipping into the gulch, with the hanging wall conveniently washed away.

shown in the results. These samples are crushed down and divided into two parts, one of which is "horned," and its companion assayed. In addition to this, the powder from the drillings of each pair of men is horned twice daily, or after each shift.

The valuable ore is encountered in shoots, which occur at quite regular intervals, with spaces of the general vein intervening. The ore shoots never occupy the full width of the vein, but will probably average seven feet, in places widening to 12 or 14 ft. The values are frequently separated from the hanging wall by a band of poor ore four or five feet thick, which in most cases is not broken. Only in a few instances has good ore been mined on the foot-wall. In one case a chimney of ore approximately barrel-shaped was taken out, whose vertical axis measured 70 ft., and its lateral dimension 30 ft. This body was composed of a large mass or net work of stringers, and was extremely rich.

The principal values are in gold, and to such an extent that silver is almost negligible, the ratio approximating 1:40 (silver to gold). This gold is practically free-milling, the major portion being gathered on silvered-copper plates.

The labor is all native, fairly efficient and easily handled, strikes being entirely unknown. The drillers earn $2.25 Mexican per day, working in pairs, and are required to drill 10 ft. of holes. This task is accomplished in about six hours, when they are allowed to leave the work. Laborers and car-men, inside, work eight hours; and top men, ten hours. The scale of wages (Mexican) is as follows: Drillers, $2.25; car-men, $1.75; muckers, $1.50; pump-men, $3; top-men, $1.50; hoistmen, $3.

The ore is delivered to the mill by means of a Hallidie tramway, 2,700 ft. long. The difference in elevation is 1,200 ft., and the tramway runs by gravity. Four men and one boy are employed in its operation.

The mill was made in sections approximating 30 lb.; it was the transported from Minaca on mule back, and erected under instructions of Fraser and Chalmers. It consists of 20 stamps, 850 lb. each, operating at 95 drops per min., and crushing, with water, 50 tons of ore per day to pass a 35-mesh screen, No. 26 wire. The pulp is passed over silvered-copper plates, 10 ft. long, where 90% of the values extracted are caught. The tailing from the plates is led into hydraulic classifiers, and from there is passed over two Bartlett concentrators. Formerly four of these tables were in service, but it was found that by the use of classifiers and only two tables more satisfactory work could be accomplished. The concentrate assays about $600 per ton, and is shipped to Chihuahua for sale. From the concentrators the tailing is run to waste or treated in eight pans and four settlers, according to whether it is high enough to pay for such treatment or not. The middling from the concentrators is treated in pans and settlers by amalgamation; and a satisfactory extraction is made from this middling. The amalgam from the plates and pans is retorted once a month; the sponge is made into bars, which are shipped to the United States. This bullion averages .550 fine in gold and .440 in silver. The total production of the Sahuayacan mine has been $1,000,000.

The scale of wages at the mill (Mexican) is as follows: Laborers, $1.75; crusher, $2; battery, $3; battery helper, $2.25; pan-man, $3.50; firemen, $2.50; engine men, $2.

All men in the mill work 12 hours. The work is superintended by one American on each shift, and an American amalgamator on the day shift.

All values referred to in this article are in Mexican pesos.

Wollastonite.

A paper, entitled "Polymorphic forms of calcium metasilicate," was recently (Nov. 9, 1905) presented by Dr. E. T. Allen before the Chemical Society of Washington, D. C. The results of the investigation[1] were substantially as follows:

Calcium metasilicate ($CaSiO_3$) crystallizes in two different forms: the mineral wollastonite, which is monoclinic, and an artificial form (pseudo-wollastonite), which is pseudo-hexagonal; these are enantiotropic polymorphs, with an inversion point at 1,190° C. The artificial form is more stable above this point; therefore, to synthesize the natural mineral the melt must first be chilled to a glass, and this then devitrified below the inversion point (800° to 900°). Reversion from pseudo-wollastonite to wollastonite does not take place when the two forms are heated together below the inversion point; but this may be effected by the addition of calcium vanadate which dissolves the pseudo-form, from the solution of which the more stable wollastonite crystallizes. There is scarcely any volume change in the inversion, the sp. gr. of the wollastonite being 2.915, and that of the pseudo-wollastonite 2.912. An "inversion temperature" is a point at which two solids are in equilibrium; it remains unchanged no matter what solution the mineral may crystallize from. It is only the temperature of crystallization which is affected.

Since neither pseudo-wollastonite, nor paramorphs of wollastonite after pseudo-wollastonite, are found in nature, it follows that natural wollastonite has always formed below its inversion temperature; and since wollastonite is very characteristic of contact metamorphic zones, the foregoing may have an important bearing on the temperature of contact metamorphism.

W. P. White then presented a paper entitled "A thermal study of the mineral wollastonite" made by himself and Messrs. Allen and Wright. This substance, often found in lavas, was studied to get a probable limit to the temperature that the lava had reached.

Calcium metasilicate, $CaSiO_3$, exists in two forms; one, wollastonite, stable below about 1,180°, and a monoclinic form (pseudo-wollastonite) stable above that temperature. If wollastonite is heated, it changes readily to the other form; but, to get the reverse change, is often a matter of some difficulty, Hence, on cooling a charge of the melted mineral, if crystallization occurs, as it usually does, above 1,180°, pseudo-wollastonite is found. It is only now and then that the undercooling is great enough to allow wollastonite to crystallize. Wollastonite can be formed readily, however, by chilling melted material so that it becomes glassy at ordinary temperatures, and then heating this glass to a dull-red heat. The melting point of the pseudo-wollastonite is 1,512°. Nine determinations on four separate samples showed a maximum variation of 2½° in the determination of this point.

One conclusion from the work is that the temperature of lavas and of other rocks, where wollastonite is found cannot have exceeded 1,163 degrees.

[1] *Science*, XXII, No. 570, Dec. 1, 1905, p. 703.

Decolorizing Contact-Process Sulphuric Acid.

Sulphuric acid made by contact processes is generally colored dark by impurities. It has been discovered, according to *Chemiker Zeitung* (1905, No. 95, p. 1232, German patent, 164,722, July 24, 1904, M. Liebig, Warsaw) that such acid, of whatever concentration, can readily be decolorized in the cold by the addition of peroxides, as of lead or barium peroxide. For example, lead peroxide may be added to the acid with constant stirring, and in slight excess, or until the peroxide no longer dissolves, but, colored dark brown, falls to the bottom. If this is then separated by a sand filter, the filtrate will be colorless and free from objectionable impurities, notably sulphurous acid and iron. Fuming acid will not become perfectly colorless, but retains a yellow tint.

A mixture of two-thirds pine tar and one-third linseed oil is a good coating, or rather preservative for wire ropes running underground or in water. It is not strictly necessary to boil the tar, though preferable. This is the mixture used by most cable roads.

Joseph Aspdin, a brick mason of Leeds, England, made the first artificial cement in 1824.

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THE NEXT ISSUE of the JOURNAL will be the annual statistical number, in which the progress of mining in many parts of the world in 1905 will be reviewed by excellent authorities.

IN VIEW OF the probability that the compositors of this city will strike on Jan. 1, 1906, for eight hours' work with nine hours' pay, and the perpetuation of the closed shop, we ask our readers and advertisers to be lenient with us for delays or other shortcomings in the JOURNAL for a few weeks after Jan. 1. We shall do our best to make these delays and shortcomings as few and as small as possible.

THE RECONSTRUCTION of the plants in the Baku oilfield is going ahead actively, the latest disturbances in Russia apparently not having affected the Caucasus. The outlook in many parts of the Empire is so ominous, however, that a renewal of trouble anywhere would be no matter for surprise. These internal difficulties must inevitably have a serious effect upon the mining industry of Russia, which will be felt not only in that country, but also in the others which do business with it.

THE YEAR 1905 closes with prices for the metals remarkably high and a general inflation in the value of securities that are dealt in on the stock market. Commodities generally are high in price and the situation has inspired the inquiry as to whether the great increase in the production of gold has been contributory. Any such connection would be very difficult to establish. It is simpler to believe that the market conditions are due to our great crops, increase in population and general prosperity, which combine to create a greater demand for the necessary commodities.

The New Almaden Quicksilver Mines.

The prospective closing down of the famous New Almaden mine, in Santa Clara county, the most productive quicksilver mine ever found on this Continent, and the oldest one, is worthy of mention. For a year past men have been gradually laid off at the mines, until at present there are less than 75 men employed about the whole property. The mines are owned by the Quicksilver Mining Company, of New York. The grade of ore has in the last few years been very low indeed, and has paid no profits. It is understood that it has been only about 0.5%.

In recent years the New Almaden has fallen from its position as the largest producer of quicksilver in the United States, the New Idria, in San Benito county, among others having exceeded it in output. The Quicksilver Mining Company owns several thousand acres about its mines, with complete reduction works, machinery, etc. The property was for many years the most important in California, and employed the largest number of men. It is to be hoped that prospecting will develop new orebodies which will lead to a rejuvenation of this once famous mine, which heretofore has been important, not only in the commerce, but also in the metallurgy of quicksilver.

Chinese Labor in the Transvaal.

The change of ministry in Great Britain is likely to have an important effect on gold mining in South Africa, if the present cabinet be continued in office. The Liberals are committed to the cessation of the importation of Chinese coolies under contract, and the Premier certainly has the courage of his convictions, inasmuch as orders to that effect have already been issued. No more coolies are to be imported until a freely elected parliament of the Transvaal has decided that the country wants them. Regardless of opinion as to the merits of the question, no one can refrain from admiring the boldness of the Government in making this decision when it has but recently come into power and is on the eve of a general election, in which the powerful influence of the great South African mining houses will be thrown against it because of this action.

As in most questions, there are two sides to this. The characterization of the bringing of coolies to South Africa as a new slave trade, which appeals so strongly to the British conscience, is, of course, hyper-sensitive and very much exaggerated. The behavior of the coolies, and the treatment of them by their employers (and their agents) are fair subjects for discussion. The reports which we have received from the Transvaal have not indicated any alarming or inhumane condition of affairs; nor anything beyond the infractions of regulations and cases of discipline that would naturally be expected in the management of 45,000 men.

There would have been no idea of taking Chinese to the Transvaal if anything

approximating to an adequate supply of native labor had been obtainable. It was not. This question of securing the necessary labor to conduct great enterprises in some of the remote parts of the world is one of the serious problems at the present time. In all probability the American Government will be confronted by it, when the time comes for active construction of the Panama Canal. We have made up our minds that the Canal is to be built, and doubtless we shall reconcile ourselves to the employment of labor under conditions which would not thoroughly meet with our approval at home. If, however, that be necessary, as it has been in South Africa, the regulations affecting the employees and their rights should be legally established, and not left solely to the contractor, or mining company, or whoever may make the bargain.

The End of the Year.

It is a good old custom to devote the closing hours of the year to a consideration of the shortcomings of the past, and the formulation of resolves to do better. This duty performed, we were ready to welcome the new year and start out hopefully on its labors. In past years THE ENGINEERING AND MINING JOURNAL has made its first number of the new year a record of progress and achievement; but it has also taken occasion to preach yearly a sort of "watch night" sermon, in the belief that such a course may be not without some benefit to its readers. The year 1905 has been one of great prosperity and profit to the mineral industries, as our next number will show; but it has not been without its faults. Perfection, alas! cannot be achieved instantaneously.

Progress in metallurgy has been considerable, but there is yet much, very much, to be achieved. As in years past, attention has been given mainly to expediting work; to increasing product and turning out material on a large scale. Now these are good things to do, but there is always danger in fixing attention too much on quantity. We can excel the world in large and rapid production, but we fall behind in details, and are crude in methods compared with some of our rivals; and we really depend upon them for improvements which would have been obvious, had we stopped to think about them.

Haste and waste go together, and in our metallurgical practice we are the most wasteful people in the world, especially in the iron and steel industries. Our natural resources are so great that we have not thought economy necessary. We can turn out more iron and steel in a year than both our chief competitors combined; but the German iron-worker finds more profit in pig iron and steel made from 35% ore high in phosphorus than our iron-masters do with 55 and 60% ores comparatively free from impurities. We hold our home market, but in competition where a protective tariff does not run, the German can undersell us every time. He does it because he takes thought of small things and throws nothing away. The German iron works have chemical staffs always at work, experimenting to see where savings can be made, and they are gradually approaching the time when the by-products will be the chief value and the pig iron itself the by-product. A striking illustration of this wastefulness is the fact that nine-tenths of our coke is still made in the old-fashioned bee-hive ovens; and that nine-tenths of the gases from them are thrown away. We move heaven and earth to utilize the water-power of Niagara, while not many miles away the coke-ovens of the Connellsville region are poisoning the air with gases which, if properly utilized, would make more power than three or four Niagaras. Here is a sin of omission which is worth thinking about.

We have made more progress during the past year on the doubtful road of consolidation and combination. Perhaps this falls rather to the political economist than the mining engineer for discussion. But it should be understood that the gathering of the control of our mineral resources into a few hands must in the end benefit only a few; and it is sure breeding of trouble for us and of greater trouble for those who will come after us.

More or less akin to this is the fact that we have made no progress in settling labor troubles. Capital and labor are further apart, if anything, than they were a year ago. We close the year with the shadow over us of the possibility—we hope not the probability—of a great strike of the miners in both the anthracite and the bituminous coalfields. It will take only a few hot-headed or stubborn men, on either side, to bring about this greatest possible check to our prosperity. Experience has certainly not taught us wisdom in this respect.

Another bad tendency which seems to have made progress during the past year is the habit of relying too much on the Government. At the recent meeting of the Mining Congress, almost the whole burden of the proceedings was found in appeals for Government aid. Surely, the great mining industry is able to go alone, without nursing and without subsidies. But too many seem to think it cannot. And the Congress, which might have spoken on the point with some effect, did not speak on the one point when Government aid would be really valuable—the amendment of the Federal mining law, in such fashion as to benefit the miner more and make it less a bonanza for the lawyers.

The dishonest promoter and the fake mining company we have still with us, and this year they have prospered exceedingly, as they are apt to do in active times. Mr. Aubury, of California, has tried to take action against them, for which he deserves all praise. He has had too few backers and too few coadjutors elsewhere, and there is very much to be done to check this evil, which has so sorely injured mining investments in the public estimation.

Last, but not least, we have had too many accidents. In some respects this is a phase of the reaching after quantity to which reference has already been made. We have been too much in a hurry to make a big output to spare the time to make mines safe. There is blame to be placed all around here, for no small proportion of the accidents are to be traced to carelessness or disobedience of orders on the part of the miners themselves. Men shirk their work without thought of the consequences, and herein they should be restrained, since in most cases those consequences fall on others as well as themselves. Mine-owners and operators are too often to blame, but they are not responsible for all accidents. It has been well to see, a few days ago, the righteous judgment of a Pennsylvania court, which held a miner responsible for injuries to his helper, because he had neglected to put in the roof props, and left the helper to load the coal, unaware of the danger of a fall of roof. It is a good precedent, and ought to be applied in a great many cases of injury from blown-out or windy shots due to careless placing or loading of holes. The making of a mine safe takes a good owner and an efficient superintendent; but it takes also honest miners. That all par-

ties have been to blame this year is only too evident from the record.

But it is well to bring the sermon to a close, lest it weary the brethren. If they will only take its meaning and give some thought to it, the preacher will be well satisfied.

The Opposition to Gold Dredging.

Our San Francisco correspondent has frequently referred to the opposition of individuals and associations of that State to gold dredging. It must be admitted that some of the objections, although they have been greatly exaggerated, are well founded. The following is typical of the outcry against dredging. Mr. N. B. Crane, of Oroville, Cal., the most prominent dredge-mining center in the West, relates his experience.

"Farms were purchased and quickly desolated by the dredgers," says Mr. Crane, "until finally they reached my farm. I held on as long as I could, until the dredgers had turned into absolute ruin farms all around me. All about me was desolation, as complete as could be made. There was nothing left of the orchards but piles of stones and earth. And so I, too, sold out my land. In the course of time the 10,000 acres of productive land on Feather river will be rendered absolutely worthless by these dredgers that are slowly and surely plowing up the orchards and abstracting the gold, so that the soil will be unfit for cultivation for the next 100 years or more. The owners of dredges make much money, they pay good prices for the farms; but it is a great pity to see the beautiful orange groves and rich farms covering 10,000 acres along Feather river completely wiped out of existence. Oroville was the center of the earliest orange belt in California."

This account is exaggerated, inasmuch as much of the dredging ground at Oroville, as well as in other districts, was practically worthless previous to the installation of dredges, and the circumstance that the dredge operators paid excellent rather than "good" prices for land, has been overlooked. However, the fact remains that some damage is being done.

It is alleged that dredging for gold as commonly conducted in California has shoaled navigable rivers (by disturbing the fine material of the river beds, and allowing its transportation to the lower reaches); that it has affected the health of residents in the dredging districts (by leaving pools of stagnant water among the tailing piles, and by making the summer nights hotter, as the piles of boulders are said to act as reservoirs of heat, absorbing it during the day and radiating it after sunset); that it has ruined large areas of fertile agricultural land (by leaving the worked-out ground with its original section reversed, the fine material of the surface being transferred to the bottom and the coarse boulders of the bottom being deposited on top); and that it has damaged contiguous and adjacent interests (by reason of the general depreciation of land and other values, resulting from the metamorphosis of neighboring fertile farms to barren wastes).

That most of the above alleged evils are easily remedied, and that all can be ultimately corrected, is fortunately true. There are no such difficulties as those incident to hydraulic mining on a large scale in California, where millions of cubic yards of material must be retained in steep ravines having topographic characteristics unfavorable for storage sites. If damage to navigable rivers is being done, the manipulation of dredges can be conducted, in nearly every instance (by keeping a wall of coarse boulders between the river and the point of discharge of fine tailing), so as to prevent the possibility of harm. The other phases of difficulty, as well as the agitation by advocates of estheticism, who have objected to the disfiguring of the dredging areas, can all be met by a method of operation which will leave the alluvion (after its passage through the dredging apparatus) in its original position, that is to say, with the fine material on top. This has been attempted in Oroville when the fine was elevated by a sand pump and deposited on top of the coarse boulders. It was discontinued after a short time, as the cost of maintenance and operation of the pump was greater per acre of ground excavated than the original value of the land for agricultural purposes, and far greater than the value of the land in its "restored" condition. "Restored" land requires time for a complete recovery of its fertility.

Dredging in the United States has been conducted without regulation, and a short-sighted policy, distinctly American, prevails. It is reprehensible when it results in devastating rich land unnecessarily. It seems entirely feasible to leave worked-out ground in such condition as to possess agricultural value. This has been shown in New Zealand. The McGeorge Dredging Company, operating at Waikaka, has a plant which effectively restores rich agricultural river flats that have been dredged. One set of elevators takes the boulders and deposits them where required, while another discharges the sand and silt on top of the stones. There seems to be no good reason why this, or other devices which accomplish similar results, should not be adopted in this country. They are not costly, and it enables dredgemen to work in harmony with all other classes. The economic advantages which would be conferred upon the State are of much importance. It would, moreover, forestall the growing agitation which is likely to result in ill-advised legislation of such extreme character as will seriously hamper the dredging industry.

We hope that those responsible for the ill feeling in California will modify their practice, as has been done in New Zealand and Australia. Experience there has shown that a greater consideration of other interests would have resulted in better present conditions; and possibly the irksome (and in many cases unnecessary) regulations would not now be in force. It is a serious mistake to believe that any branch of mining, no matter how lucrative, can long be successfully carried on when unnecessary damage is being done and public sentiment is, consequently, hostile. Gold dredging has passed the experimental stage, and is an established industry of growing magnitude and importance. It can be successfully pursued with damage to riparian rights so slight as to be negligible; the harm now done to other interests can be turned to positive benefit (some land can be actually improved by dredging), if intelligent foresight and unselfish procedure shall characterize future operations.

We recommend that American dredgemen pay greater attention to New Zealand and Australian practice, where time has solved many problems not yet existing here, but sure to materialize as the industry ages and expands. Dredging has been successfully conducted in New Zealand for over 25 years, in the United States only a little over 10 years. These figures are pregnant with suggestion.

Metallics.

Neither moisture nor machine oil should be allowed to accumulate on belts.

Rolls for crushing ore invariably give the best results when fed mechanically.

Germany prohibits the use of acids or chloride of zinc for soldering cables or other similar electrical conductors.

Phosphor-tin is now coming into general use; it is valuable in the brass foundry in red metal mixtures, particularly where scrap is used.

A mixture of copper containing 2½% of silicon may be readily drawn into wire or rolled into sheets and excellent spring metal has been made from it.

Iridium is one of the non-ferrous metals which rival steel in hardness, and there are many instances in which it could be used where a hard, non-corrosive metal is necessary.

A brass mixture which has nearly the same coefficient of expansion and contraction as cast iron is the ordinary gun metal or 88 parts of copper, 10 parts of tin, and 2 parts of zinc.

The best electric-lighting plant in China is at Shanghai, where there is one under municipal control. A franchise for a modern electric railway system has also been granted there.

In a compressed-air pipe-line there is no loss of energy by heat radiation; hence the larger the pipe the greater its efficiency in conveying the air without reducing its final pressure at the drill.

Carborundum is superior to emery for chilled roll grinding. The time spent in grinding a pair of chilled rolls is so much that the difference in cost between emery and carborundum is of slight importance.

Canton has an electric light and power plant, which has just obtained a 30-year monopoly. At Hongkong there is an electric street railway which is paying well. There is also an electric light and power plant.

Seamless drawn tubing requires a hollow billet for the starting point. In the old method these were made by casting around a sand core, but the present practice is to pierce by boring and by hydraulic pressure.

In the gold mines of the Transvaal, each machine-drill requires on the average 20 drills per shift. Assuming the average weight of the drill to be 15 lb., there is 600 lb. of steel to be carried to and from the shop for each machine per shift.

As quartz vessels do not soften at a high temperature and are not apt to crack, it is found that a vacuum can be produced in them; and at the same time any metal which is placed inside, can be heated and distilled. This gives a new method for distilling certain metals in a vacuum.

Pin-holes in brass castings are the greatest difficulty with which the brass founder has to contend. They are discovered only when the casting is machined. A casting may have a sound and clean appearance before machining, only to show thousands of minute cavities after the first cut has been made.

The addition of aluminum to yellow-brass sand castings is inadvisable. Aluminum renders the metal very free running, so that more pieces may be placed on a gate; but it also produces a casting which will leak under pressure. It is largely used, however, in the saddlery and hardware trades.

"Aluminum gold" is an alloy of 96% of copper and 4% of aluminum. The color of this alloy is the nearest approach to 14-karat gold that is known. The large amount of copper unfits it for any place where a non-corrosive alloy is required, but as far as color is concerned it cannot be surpassed.

Silicon-copper of proper proportions makes an excellent spring metal. The alloys of copper and silicon may be rolled into sheet or drawn into wire, if the silicon content does not exceed 4%. The alloys between 3 and 4%, however, are almost too hard to draw into wire and a lower percentage is preferable.

Pin-holes, or blow-holes in brass castings (they are both the same, except one is larger than the other), are produced in three ways: By overheating the metal. By allowing the metal to "soak" while in the fire (to remain in the fire a long time after it has become liquid). Or, by melting very finely divided metal, such as chips, grindings, or similar forms.

Nearly all commercial platinum contains iridium, as the latter metal is associated with it in the ore. It is an expensive operation to remove it completely, and as iridium is cheaper than platinum, it is customary to leave as much in the platinum as possible. An alloy of 1 part of iridium and 9 parts of platinum is extremely hard, as elastic as steel and capable of taking a high polish.

Silicon-copper has one objectionable feature which might unfit it for some uses, but unless it is to be left bare this objection would not be of importance. The alloy readily tarnishes and soon becomes covered with a black film from the oxidation of the silicon. This oxidation is only superficial, however, and is of no importance unless the material is to be used for ornamental work.

Lead resists the action of sulphuric acid better than any other common metal, and a bronze mixture high in lead makes a serviceable acid-metal. The bronzes high in lead give the best results. They are open to the objection that they are deficient in strength, and if made into valves, or similar articles which are to stand a considerable pressure, they frequently burst or otherwise give way.

A new possible source of nickel is found in the heavy residues from gold washing, near Lillouet, on the Fraser river, British Columbia. Of this residue, 47% consists of rounded, irregular grains of an iron-nickel alloy, similar to the awaruite of New Zealand. These grains have a sp. gr. of 8.22; the composition is: Ni, 75.5%; Fe, 22.0%; Cu, 1.2%; silicious matter, 1.2%. The mineral has received the name Souesite.

Cupro-nickel is an alloy composed of copper and nickel and is used for covering the bullet of the cartridges used by the United States and other governments. The covering is called a "bullet-jacket." Cupro-nickel is composed of copper 80% and nickel 20%. There is also a lower grade used which contains only 15% of nickel. These alloys contain no zinc. The alloy, in slightly different proportions, is also used for the blades of some makes of steam-turbines.

It frequently happens that the quantity of brass chips which are formed in the manufacture of certain articles exceeds in weight the product itself. The small labor cost renders such an operation possible. Brass chips are produced in great quantities and are known in the metal trade as "Yellow brass chips" or "Screw-rod chips." They are one of the standard commodities of the trade and their uniformity of composition renders them quite attractive to the brass founder for re-melting.

Leaded brass chips are known by their short or brittle appearance where fractured. The lead imparts to the brass a quality which allows the chip to break off under the action of the cutting tool. It does not produce long, fibrous shavings like those which are formed from brass free from lead. Lead imparts a free cutting quality to brass and a short, brittle chip is the result. Leaded brass chips may be detected by their appearance, and it is rare that one actually sees any other kind.

In riveting with pneumatic hammers, two men and one heater averaged 500 rivets in 10 hours; whereas by hand 250 rivets was a good day's work for three men and one heater. The cost per rivet was 1.62c. by pneumatic hammer, and 3.68c. by hand. On 93,480 rivets in a shipyard at Chicago, the machine cost was 1 to 2.5c., according to size; the hand cost, 2.5 to 4.5c. On 1,300,000 rivets at Cramps' shipyard, near Philadelphia, the hand price was 7c. for 1-in.; machine, 3c. For ⅞in. the hand cost was 5.5c.; machine cost, 3c. In general, riveting with the pneumatic hammer is 40 to 50% of the cost by hand.

Colliery Notes.

At the Pendleton colliery, Lancashire, England, the consumption of coal for working purposes was formerly only 5% of the total product; it is now 10%. This includes the coal used for hoisting, haulage, air compressing and pumping. The cost of haulage is now more than double what it was 20 years ago.

The "blue cap," which is generally taken as the best indication of the presence of dangerous explosive gas in collieries, depends not only on the kind of lamp used, but also on the nature of the oil and the luminosity of the flame. Under ordinary conditions ⅛ in. of flame on the Davy lamp shows the presence of 2% of gas.

In the Alexander and Abram pits, Wigan, Lancashire, England, operated at depth of 2,700 ft. as maximum, although the temperature of the air underground rises to 91° F., the men do not call it hot and do not specially complain. The air is hot, but not unpleasant, so long as its movement can be felt. The men in these mines work nine hours per day.

The cleavage in coal seams and roof strata are due to the same force. Assuming that in a given case the cleavage planes are vertical, it is generally held that the same force, acting laterally, and at right angles to what are now cleavage planes, was the cause of such cleavage being developed in the strata. Such a lateral force is caused by the shrinkage in the earth's crust.

Every colliery roof is subject to gravitation, in virtue of which it is endowed with weight, pressure, and in long-wall working, with motion, momentum and kinetic energy. Every roof also possesses a certain amount of elasticity. The roof always bends before it actually breaks. This is a matter of great importance in coal working, and by taking advantage of it, considerable economies in working costs are made.

In the western portion of the South Wales coalfield, the seams are not worked in any definite order, the practice being to work the most profitable first. It is considered, however, that it would be preferable to work in ascending order from the bottom seam upward, both as regards the cost of working and cutting. In this way, the lower seams would be worked out before they became flooded by draining from the upper seams.

Numerous experiments carried out in England prove that when a fall of roof suddenly liberates gas, a safety lamp of the bonneted Clanny type and one which is perfectly sound under ordinary condition, might be suddenly filled with gas, and the resulting explosion might carry the flame through the gauze without leaving any indication on the gauze or glass; only the extra clearness of the gauze would indicate that it had failed to fulfil its object.

At Dowlais, in South Wales, a seam of coal only 1 ft. 9 in. thick is worked successfully at a depth of 400 ft. An output of 12,690 tons per annum is obtained from 27 men, equivalent to 470 tons per man. This figure exceeds those for all the thicker seams worked in the same district, the depth of the latter being, however, from 1,000 to 2,300 ft. The thin seam referred to in this paragraph was worked from a drift in the outcrop, and had a very good roof. The fact that no repairing work was required accounted for the large output.

The Niddrie colliery, at Portobello, is the deepest coal mine in Scotland. At a depth of 2,623 ft., the temperature of the great seam, measured in the solid coal face, was found to be 74° F. The ratio of increase would be 1° F. in 105 ft., assuming as a datum the temperature of 50° F., at 50 ft. depth. The low temperatures of the collieries of this coalfield are attributed to the high inclination of the strata on the outcrop edges, where mining has hitherto been mainly carried on. The dips vary from 80 to 90°, thus affording an easy outlet for the escape of internal heat. The greatest heat noticed in the workings was found on approaching old wastes which have no outlet to the rise.

Attempts to introduce coal-cutters in the Forest of Dean Coalfields, England, were unsuccessful. With a seam only 18 in. thick, a considerable quantity of either floor or roof had to be removed to give sufficient room for the working of the machine. The shale band, which usually underlaid the coal, and in which the collier holed was thin, and to work a machine it would be necessary to cut away some portion of the seam itself. Ironstone nodules, small faults, and a variable and undulating floor, were all deterrent to the use of coal-cutters. It was usually found that in the thin seams, the roof was stronger than in the thicker ones, the roadways and coal faces required less timber, and the cost of maintenance was consequently less.

The majority of accidents to air-compressors through explosion are caused in the vicinity of the discharge pipe and receiver. An explosion rarely takes place immediately in the cylinder. Accumulation of combustible matter, together with a terminal temperature at the end of a compression stroke sufficient to start combustion, accounts for the cases of ignition; the presence of a gas or vapor forming an explosive mixture with air, with a temperature equal to the burning point of the vapor at the pressure, accounts for the cases of explosion. The combustible matter is usually derived from the lubricant used together with dust from the air. Compressors employed on collieries should be kept thoroughly free from coal dust and accumulations of oily matter. Where possible the air fed to the compressor should be passed through some filtering material.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Mining in Brazil.

Sir—The following remarks have been suggested by the paper of Mr. Curle, on "Gold mining in South America" in this JOURNAL (Sept. 30, 1905, p. 577). The laws of Brazil make the owner of the soil the owner of the subsoil. On Jan. 1, 1900, a new law went into effect which had, and has, for its purpose the aiding and encouragement of the development of the mining interests of the country. The main feature of the law provides that any local or foreign company, duly registered with the Federal government, buying abroad and importing into the country, in its own name and for its own use on its own properties, machinery and supplies directly necessary for the pursuance of its legitimate operations, shall and may pass the customs department on the payment of an "expediente" tax of 5%, plus charges; making a total tax of about 6¼% on the invoice value of imports. Under the head of imports will come all machinery for mining, hoisting, crushing, milling, concentration and reduction, and all supplies, such as steel explosives, quicksilver, cyanide, tools, etc.

The export duty on gold is 2½%; land pays a very low tax; and, in some sections, a municipal tax is levied on each stamp in operation.

The various laws seem very equitable and simple in operation; the law just mentioned has been of great help to the mines in operation, as will be seen by citing the cost of explosives. Previous to 1900, blasting gelatin, laid down at mine, cost 145s. per box of 50 lb.; since 1900, the same only cost 84s. per box, a difference of 61s., a great saving to the mining industry.

Many districts are well timbered and watered. Large sums in gold and diamonds have been won from the alluvial deposits and the rivers; considerable gold is yearly taken from the mines.

The country, as a unit, has not been prospected. Very few areas have received intelligent examination, but the results of this have shown the wide and, in some instances extensive, distribution of its diamond, gold, iron and manganese deposits.

Diamondiferous deposits are very extensive in the states of Minas Geraes and Bahia; gold is in evidence all over the states of Minas Geraes and Goyaz; though deposits, where it is sufficiently concentrated to make a commercial success, are few; that there are many deposits awaiting discovery cannot be doubted.

The rivers of Goyaz and Minas Geraes are known to carry gold and diamonds, and many of them present ideal conditions for dredging. Neither of these States is difficult of access.

Minas Geraes has many large deposits of manganese and metallic iron ores, easily mined and close to railway lines; some run as high as 55% manganese, and are low in phophorus; others have 75% metallic iron and are low in phosphorus. Up-to-date land and sea transportation, and intelligent administration, sooner or later, will bring the Brazilian ores into the American and European markets; especially in the European ports, these ores may compete on favorable terms with Spanish and Swedish lower-grade ores.

Spain exported about seven million tons in 1904, England taking nearly five million tons. Today Spanish ores and ocean freights are higher; moreover, it is recognized that the Spanish ores are becoming more expensive to mine, and are falling in metallic contents. It seems reasonable that the cheaply-mined higher-grade Brazilian ores, which are known to exist in large deposits, will, within a few years, be called upon to supply the English consumers and probably some of the Continental demands also.

The stability of the present Government; its favorable laws; the desire on the part of State officials to see their resources developed; the great area covered by, and the diversity of, its minerals and metals; its cheap and efficient labor, its rivers, forests and good climate; all these tend to make the states of Goyaz and Minas Geraes, especially, an attractive field for capital and labor

It may be well to state that at a short distance from the coast, one enters the foothills and table lands which offer a climate that is unexcelled.

C. S. Richardson.

Paris, Oct. 11, 1905.

Enrichment of Fissure Veins.

Sir—Enrichment in veins (to which you draw attention in this Journal, Sept. 30, 1905, pages 594 and 597) opens up a large field for discussion.

In my opinion, there is no doubt that different conditions prevail at different depths, and with varying results.

At the surface, we often find a "gossan," that portion of the vein which is thoroughly oxidized, in the case of gold reefs; while sulphides have been removed, the gold remains, and we get higher values than would obtain if the sulphides were present to dilute the total.

Below this surface aspect, as we can follow the reef, say, to, and below, water level, it is generally oxidized and richer than in depth—apparently owing to two causes, namely: The removal of the sulphides; and possibly, secondary enrichment.

At or below water level, we find what J. E. Spurr calls "Secondary sulphide enrichment." That many of the sulphides are secondary there is no doubt; but where they commence and where they end, it is difficult to say.

That which, for want of a better expression, I have always designated as "secondary enrichment," has on many occasions been forcibly impressed on me while opening new reefs, and has brought me to the two conclusions following:

1. Gold-bearing veins or reefs tend to become poorer below the oxidized portions, when the sulphides are reached.

2. The oxidized section of most reefs has derived additional gold, besides its inherent gold content.

In the second instance, this can be clearly seen by flakey gold; on several occasions in this country I have obtained perfect gold dentrites in the cracks and on the faces of ordinary quartz in the upper portions of a reef, while with depth, these dentritic incrustations disappeared.

Other instances are common, as of quartz containing cubical cavities (once occupied by iron pyrite); specimens of these show the cavity filled with a delicate mass of fine gold, so light and soft that it cannot be felt when touched by the finger; the least contact causes it to collapse, while a breath of wind will blow it away.

It would require only slight chemical or mechanical influences to transport similar gold to lower sections or zones of the same reef, and thereby enrich them materially if this process continued over the course of a long stretch of time, while the upper layers are being denuded. It would be a natural consequence for the upper reef portions to enrich themselves more than the remoter and more compact sulphide zone would do.

There are many tangles to unravel before we can speak with certainty, yet the subject is most interesting and likely to be of great practical value.

Cyril E. Parsons.

Bulawayo, Rhodesia, S. A.,
Nov. 20, 1905.

Life and Mining in the Tropics.

Sir—In a recent issue of this Journal (Dec. 23, 1905, p. 1153) G. M. Colvocoresses writes on this topic, and incidentally depreciates the climate of the northeastern portions of Australia.

He asserts that in Queensland the thermometer often reads 120° F. in the shade; that there is little cool weather there during any part of the year, and that the long-protracted heat wears a man down to low vitality and lays the system open to various malarial complaints.

It is clearly evident, to any one familiar with Queensland, that Mr. Colvocoresses' acquaintance with that State is very limited. As a matter of fact, the Queensland climate can scarcely be improved. It is sub-tropical; almost anywhere over its wide area magnificent peaches, apples and pears can be grown, amidst orchards full of luxuriant orange, pomegranate and banana trees.

The temperature during a few days in midsummer does approach 120° F.; but such a heat is exceptional. Mr. Colvocoresses has been wrongly informed as to the duration of such weather. Residents in Queensland never tire of praising their glorious climate.

The reference to malaria is also misleading. Early last century, when the white settlers were opening up the country around Mackay, Cooktown, and Port Darwin, cases of malaria occasionally occurred; but the disease is not prevalent now. Cases are sometimes found in the hospitals in the coastal towns in summer; but these cases of fever, for the most part, are contracted in New Guinea or the New Hebrides.

Australians are interested in the development of these islands and there is much traffic between them and the continent; when men become invalided in the islands, they generally return to Australia to recuperate.

Ample evidence regarding the beneficial effects of the Queensland climate upon the people is furnished by the athletic records of the State. Local athletes are in no manner inferior to those in the more temperate States, such as Tasmania and New Zealand.

A. Selwyn-Brown.

New York, Dec. 25, 1905.

Fluorine in Blast-Furnace Slags.

Sir—Replying to Mr. Kneeland's strictures on the above subject in your issue of Dec. 2, I would say that there is an error of statement in regard to the determination of CaO in presence of fluorine, which is a clerical one. It may be corrected by reading "remain" instead of "dissolve" in the statement regarding the digestion of the ore by acetic acid.

I quite agree that the fluorspar remains inert, its fluorine certainly needing CaO to form CaF_2.

Again, in his last paragraph, he expresses clearly, and in another manner, the idea which I sought to bring out in my third paragraph as to the effect of the presence of fluorine in the furnace charge.

L. S. Austin.

Michigan College of Mines,
Houghton, Mich.

As the gas-engine charge is burned directly in the cylinder, there must necessarily be heat that must be taken care of and carried off. If this were not done the expansion of the hot iron would soon cause the piston to stick and the engine to stop. The valves and stems would warp and leak and the engine would be useless. Various cooling devices are used to overcome this; they operate, usually by circulation of air, or by the flow of water in a jacket around the heated parts.

New Publications.

The Production of Precious Stones in 1904. By George F. Kunz. Extract from "Mineral Resources of the United States." Pages, 120. Size, 6 by 9 in.; paper. Washington, D. C., 1905: The United States Geological Survey.

Recent Mineral Discoveries on Windy Arm, Tagish Lake, Yukon. Geological Survey of Canada. By R. G. McConnell. 12 pages. 6 by 10 in.; paper. Ottawa, Canada, 1905: Public Printer.

The Geology of a Portion of Eastern Ontario. Geological Survey of Canada. By R. W. Ells. 90 pages; illustrated. 6 by 10 in.; paper. Ottawa, Canada, 1905: Public Printer.

The Klondike Goldfields. Geological Survey of Canada. By R. G. McConnell. 72 pages; illustrated. 6 by 10 in.; paper. Ottawa, Canada, 1905: Public Printer.

Les Mines et la Métallurgie à l'Exposition de Liège. By Francis Laur and Robert Pitraval. Pages 222, illustrated. 6½ by 10 in. Paper. Paris, France, 1905: Société des Publications Scientifiques et Industrielles; 26, Rue Brunel.

Hydrographic Surveying. By Samuel Hill Lea. Pages 172; illustrated; 6 by 9 inches; cloth, $1. New York, 1905: The Engineering News Publishing Company.

Tonindustrie Kalender, 1906. Part I, Calendar and diary proper, pages 200, buckram; Part II, technical matter on clay; pages 288, with illustrations, paper; Part III, directory of firms, pages 183, paper. Each part, 3½ by 6 in. $1.00 for the set. Berlin, 1905: *Tonindustrie Zeitung.*

New York State Geologist's 23d Report, 1903. (Reprinted from the 57th Annual Report of the New York State Museum.) F. J. H. Merrill, State Geologist. Pages 198, illustrated. 6 by 9 in., paper; $0.45. Albany, 1904: University of the State of New York.

Contents—Peat, its formation, uses and occurrence, Arthur L. Parsons. Notes on the gypsum industry, Arthur L. Parsons. Abrasives, Harry C. Magnus. Minerals not commercially important, Herbert P. Whitlock. Distribution of Hudson schist and Harrison diorite in the Westchester county area of the Oyster Bay quadrangle, F. J. H. Merrill and H. C. Magnus. The northeast extremity of the Pre-Cambrian highlands, F. J. H. Merrill, with map by T. Nelson Dale.

Slices from a long loaf. By H. C. Stiefel. Pages, 222; illustrated. 6 by 9 in. Cloth, $1. Pittsburg, Pa., 1905: Bissell Block Publishing Company.

The "Long Loaf" is the voyage of a little company of friends down the Allegheny from Oil City to Pittsburg, undertaken for rest and amusement. It is not a book with a purpose; it was "written simply because the author felt like writing it." It is, however, an entertaining record of a kind of travel not often undertaken by busy men, touched up with interesting accounts of the varied industries found on the banks of the Allegheny. It is well worth reading for amusement, with a fair mixture of instruction.

The Competent Life. By Thomas D. West. Pages, 268; illustrated. 6 by 9 in. Cloth, $1.25. Cleveland, O., 1905: The Cleveland Printing & Publishing Company.

Mr. West is well known by his practical volumes on foundry-irons and foundry management. In this book he has taken up a new subject and has given us, to use his own sub-title: "A treatise on the judicious development, direction and employment of man's inherited ability to aid in the betterment of labor." Of this he is able to write from experience, for he has been, in turn, apprentice, journeyman, foreman, manager, and a writer of accepted authority. The book is, in fact, a series of essays on the conditions of labor and the possibilities of bettering them, written from a practical point of view. There is little theory in these essays; but much that both employers and employees can read with profit—whether or not they agree with the author's views. The question of labor unionism is not discussed directly; but there is necessarily much said that must have some bearing upon it. The book is an acceptable collection of the thoughts of a practical man on the great labor question that must always be with us.

The Production of Aluminum and Its Industrial Use. By Adolphe Minet. Translated, with additions, by Leonard Waldo. Size, 5 by 7½ in. Cloth. Pp. 266. New York: John Wiley & Sons; London: Chapman & Hall, Ltd. 1905. Price, $2.50.

Contents—Chemical method of producing aluminum. Processes based on the reduction by means of sodium. Processes which do not employ sodium. Electrochemical methods of producing aluminum. Electrothermic processes. Electrolytic processes for the production of aluminum. The aluminum industry. Aluminum and its alloys. Pure aluminum. Heavy alloys. Alloys of medium density. Alloys of various densities. Light alloys. Working of aluminum. Process for soldering aluminum. Electroplating of aluminum. Uses of aluminum; in commerce and minor industry; in greater industry; in chemistry and metallurgy. Aluminothermy. Industrial questions The theoretical part. Aluminum in the United States.

The Colliery Manager's Pocket-book, Almanac and Diary. 1906. Edited by R. A. S. Redmayne. Pages 376, 4 in. by 7 in.; board, $0.70; flexible cloth. $1.05; flexible leather, $1.60. London, 1905. the *Colliery Guardian* Company, Ltd.

This is the thirty-seventh volume of the series issued yearly by the *Colliery Guardian,* of London. It is a convenient hand-book, indispensable for the British colliery manager, and containing much that is useful to the coal-mine manager everywhere. The general matter includes: tables and calculations for hoisting engines; hoisting ropes; air supply and ventilation; explosives; methods of mining; coal-cutting machines, and a variety of other matters. A calendar and a diary are also bound up with the book.

The special British matter includes: information about inspection districts and inspectors; trade societies and miners' unions; examinations for mine foremen and managers; mine rules, regulations and reports; statistics of production, accidents and the like. There is also a condensed summary of important papers on coal and coal-mining published during the past year. A condensed set of instructions for first aid to injured miners is not forgotten in the varied and useful contents of this book.

The Gold Mines of the World.—Third edition, revised and extended. By J. H. Curle. With maps, plans and illustrations. 324 pages. 7 by 10 in. Cloth, $5. London, 1905: George Rutledge & Sons, Ltd. New York: The Engineering and Mining Journal.

After a general introduction on the sources of gold supply, the economic factor and mine valuation, this book takes up in sucessive chapters the gold mines of South Africa, Australia, the Far East, Russia and Siberia, the United States, Canada, Mexico, South America, and of other minor countries.

Those who have read the earlier editions know that the book is unique of its kind. Few men have traveled so much or seen so many mines as Mr. Curle. Moreover, he is absolutely independent, and has no hesitation in expressing his opinion. Of course, no one is infallible; but when Mr. Curle makes a mistake, he does not hesitate to acknowledge it. His great test is that of profits. The book is not written as, nor intended to be, a treatise on gold mining methods. It is written from the economic side entirely; reference to method or process is only incidental.

Not all engineers accept Mr. Curle's system of mine valuation. Many consider that in estimating the present value of many mines he makes too little allowance for possibilities in development, and so is inclined to understate values in many cases. Possibly his rule is too rigid. Others hold on the other hand that it is based on correct principles. In this connection, the chapter on "The Economic Factor" deserves reading by itself as a piece of critical analysis.

Since the first edition was published, Mr. Curle has extended his travels and

has added largely to the number of mines examined. The results are found in the new edition, and especially in the chapters on South America, on the Yukon, and on Siberia.

Mr. Curle's judgment on the Siberian mines is not favorable. Admitting that many of them are rich, he finds the economic factors against them to an extent which hardly exists anywhere else in the world.

The present edition also takes account of gold dredging; a method of recovery of the precious metal which has had a great extension in recent years.

The book presents a great mass of information concerning the gold mines of the world. It must be of value to all who are interested in any country. Apart from this, it is itself interesting reading. It is tersely, vigorously—sometimes colloquially—written. The author says what he thinks; and says it so plainly that it can be understood by anyone, whether engineer or layman.

The Story of the Congo Free State. By Henry Wellington Wack. Pages, 650; illustrated. 5 by 8 in. Cloth, $3.50. New York and London, 1905: G. P. Putnam's Sons.

The Congo Free State, in the center of equatorial Africa, is the most important experiment of European rule in that continent. Concerning it, there has been much controversy. One party has brought many grave charges against Belgian governmental and industrial management in the Congo; and these are denied strongly by others. The controversy has been a bitter one, and has been marked on both sides by more assertion than proof; assertion has only served to make partisans of many who have little opportunity to learn the real facts. These facts Mr. Wack has gathered, and gives in this elaborate book. It is a history of the Congo Free State, combined with its industrial and commercial geography. It is the most careful and the most nearly complete account of the country in the English language. Much of it is based upon the official records, to which the author was given free access by King Leopold.

In the main it impresses the reader as carefully compiled and correct, in so far as the facts are concerned. There is also much controversial matter, and this part is a defense of the Belgian government. Accepting the facts, and leaving the controversy at one side, the reader will get the impression that the rule of the colony has been, for the most part, judicious. Of course some mistakes have been made, and there have been some of the abuses which might be expected where a handful of white men undertake to rule a great tropical country, peopled by a variety of more or less savage negro tribes, and suffering for many years from the barbarities of the Arab slave trade. Most of these abuses were due, not to the government, but to the traders who sought only immediate gain in the exploitation of the country. The resources of the Congo are great, and they include valuable mineral deposits, without doubt. These deposits are not worked, and are, indeed, little known as yet; though a code of mining laws has been prepared to regulate and assist their development, which will come at a later day.

Annual Report of the Board of Regents of the Smithsonian Institution, 1904. Pages, 884; illustrated. 5 by 8 in. Cloth. Washington, 1905: Government Printing Office.

The contents of this volume (besides the formal report of the regents and that of the secretary, Professor S. P. Langley), include papers on a variety of subjects. Our space will not permit a full list; but they cover: Aerial navigation; telescope construction, and the application of photography to astronomical research; chemical development and progress; wireless telegraphy; electric welding; the reclamation service and irrigation; discoveries in photography; the Panama canal; archæological discoveries in North and South America; railroads in Africa; animal development and origin; and a variety of other topics, generally discussed by authors of eminence in their respective specialties. These papers are, for the most part, quite short, and are intended to give condensed summaries of the progress made in 1904 in various fields. One of the most interesting monographs is that of S. F. Emmons on the "History of the theories of ore deposition"; which is a revision of his address before the Geological Society of America at its annual meeting in December, 1903, at St. Louis.

Questions and Answers.

Sheet Zinc Rolling

How is zinc rolled into sheet? What is the best design of plant for the purpose? W. V. A.

Answer—The method of rolling sheet zinc is to remelt the slabs of spelter and cast them anew into suitable slabs for passage through "breaking down" rolls. The rough sheets obtained from the "breaking down" rolls are successively passed in bundles through other trains of rolls until reduced to the requisite thinness. The package of sheets is then trimmed to the desired size. A zinc sheet rolling mill is an expensive installation, and should not be attempted by any one without consultation with an engineer familiar with the practice.

Fishing Oil-Well Tools.

I am indirectly interested in an oil well now being driven in Cumberland county, Tenn., on the Cumberland mountain. At depth of 1,300 ft. a bit was broken in the well. A clamp or clasp was then put down to take this bit out of the well, but it was not strong enough and broke before it came out. In all probability another clasp can be put over all of this, but it will be a very thin one, and I doubt very much if it can be taken out. What is your advice in the matter? X. Z.

Answer.—We have known of several cases where a broken bit has been recovered under favorable conditions by means of a clamp or socket, but this is not a reliable method and is seldom economical or practical. If the cable had broken it would be comparatively easy to fish out the tools, consisting of auger-stem, jars and bit; but since the break is in the bit it would be almost impossible to get a socket over it which would be strong enough to do the work. It is stated that one clamp has already broken. Part of this is probably attached to the broken bit and now it would be difficult to secure a socket as strong as the one formerly used, because it cannot be as thick. Under such conditions it would be next to impossible to get another clamp over the bit.

In order to continue operations one of two things remains to be done. (1) Fill the hole for a hundred feet or so with some hard rock and then commence drilling with a view to diverting the hole so as to drill past the broken bit. This is often done successfully. (2) Move the drilling rig two or three feet and commence a new hole. This method does not involve as much risk as the first, but it is practically the same as drilling a new well and will cost more, unless the first method is a failure.

There is probably not one chance in ten thousand of securing the broken bit, if we understand the conditions correctly, and time and energy spent in trying to recover it will be money lost.

Abstracts of Official Reports.

Shannon Copper Company.

The report of this company, whose operations are at Clifton, Arizona, covers the year ending Aug. 31, 1905. The head office was moved from Boston to New York at the beginning of the year. The mine product is classified into two grades, the higher being smelted at once and the lower undergoing concentration before smelting. The ore carries a little gold and silver.

Development during the year covered 11,931 ft. at an average cost of $3.46 per foot; 2,810 ft. was in the vertical direction and cost $3.27 per foot; of the whole distance, 3,352 ft. was in ore. Some of the old stopes have been exhausted, but additions to reserves have more than kept pace with extraction, and the mine has never before had so much ore exposed. A gradual decline in its value, however, is indicated both by a less proportion of smelting ore and by a smaller amount of copper in it.

The whole output of ore from the Shan-

non mine was 188,856 tons, or 20% more than the year before; its average content was 4.08% copper, or 0.39% less than in the previous year. Smelting ore, carrying 5.15% copper, constituted 53,353 tons, or 28% of the whole; in the earlier year this class accounted for 42% of the total. Concentrating ore, carrying 3.66% copper as against 3.55% in the previous year, to the amount of 135,503 tons, showed a gain of 48% over its proportion in the preceding year's output. The levels below the Boulder tunnel accounted for the increased extraction, all stopes above that level having reduced their outputs. Ore from the open cuts, carrying only 2.2% copper, is mined for an iron flux, but only in quantities required by the smelter.

The cost per ton for mining 188,856 tons was $2.138, the leading items being: Mining, 93.2c.; timbering, 50.1c.; tramming, 11.2c.; development and exploration, 21.7c.; filling, 5.6c.; sampling and assaying, 4.8 cents.

One of the company's outlying claims, the El Paso, contributed 279 tons of ore carrying 15.5% of copper. This group is being explored by a tunnel along the limestone contact.

The mill was running only two-thirds of the time, owing largely to interruptions in transport, due to heavy floods. Crude ore is now being screened before crushing and the fines are briquetted, for the purpose of saving excessive losses of oxidized ore in the mill; magnetic concentration and picking the ore are expected to reduce losses of these oxides in the tailing.

The furnace put through a charge of 128,724 tons in the course of the year; it was made up of 52,926 tons of Shannon ore; 3,519 tons of custom ore; 29,735 tons of concentrate; 3,831 tons of fine ore; 12,949 tons of flue-dust; and 975 tons of copper slag. A convertor plant is under construction, and a blower engine and other plant were added during the year. For converting matte, the company has heretofore depended upon the kind offices of its neighbors. The year's output was 11,414,271 lb. fine copper as against 10,788,891 tons in the previous year. Of gold, 592 oz., and of silver, 17,127 oz. was sold. The average price received for copper was 14.24c. per pound.

The gross proceeds of sales was $1,631,317, and stock of metal was augmented by $60,177; operating expenses were $1,126,248 (9.87c. per pound), construction and development to the amount of $52,321 was charged against earnings, and selling and miscellaneous general expenses were $241,772, showing a net profit of $271,153 on the year's work. Expenditures of $45,650 were charged to capital, for permanent improvements. The company's capital is $3,000,000, and it has $480,000 of bonded indebtedness. No dividend has been declared this year.

Portland cement was not used as a building material until 1850.

Titration of Ferrous Iron.

G. P. Baxter and H. L. Frevert (*Am. Chem. Jour.*, 1905, XXXIV, 109-117) discuss this titration with permanganate in the presence of hydrochloric acid.

Ferrous chloride solution was prepared containing enough hydrochloric acid for the conversion of the ferrous to ferric salt; quantities of this containing 0.25 grm. of $FeCl_2$, diluted to 150 c.c., were titrated with potassium permanganate. Excess of permanganate over the theoretical amount was always necessary, but the excess lessened with rise of temperature; from 1.0% at 30° to 0.3% at 80°-85° C. At the latter temperature, dilution (between the limits of 50 and 300 c.c.) has no influence. Addition of hydrochloric acid, up to 40 c.c. (of acid of sp. gr. 1.05), is almost without influence, but tends to lessen the excess of permanganate needed. Addition of 0.5 grm. of manganous chloride was insufficient to eliminate the error, save at 95°-97° C.; but 1 grm. of the salt, or 0.5 grm. of manganous sulphate, makes the titration accurate at all temperatures. The error appears to be due to the formation, not of chloride, but of hypochlorous acid; and the effect of the manganous salt is due to its reaction with the permanganate, and the formation of trivalent or tetravalent manganese compounds, which react on the ferrous salt, these successive reactions occurring more rapidly than that of the permanganate upon hydrochloric acid.

A wrench or bar should never be inserted between the spokes of the handwheel in closing down a valve. When such means are employed the seat or disc is liable to be crushed and the bonnet or yoke overstrained; the practice is really dangerous.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Dec. 19, 1905.

807,456. CAISSON.—Edward N. Gilbert, Canadian, Tex.

807,466. FURNACE.—Henry Hubbard, Pittsburg, Pa., assignor to Woolley Smokeless Furnace Company, Pittsburg, Pa.

807,491. PROCESS OF MANUFACTURING NITRIC ACID.—Harry Pauling, Brandau, Austria-Hungary.

807,501, 807,502, 807,503, 807,504, 807,505, and 807,506. PROCESS OF CONCENTRATING ORES.—Afred Schwarz, New York, N. Y., assignor to Schwarz Ore Treating Company, Phoenix, Ariz., a corporation of Arizona.

807,532. COKE AND GAS PLANT.—Vincent G. Apple, Dayton, Ohio.

807,577. DISTILLING APPARATUS.—Johan Pernat, Cleveland, Ohio.

807,594. GAS-PRODUCER. — William H. Bradley, Bellevue, Pa., assignor of one-fourth to Alexander Gilliland and one-fourth to William C. Bradley, Bellevue, Pa., and one-eighth to Sara L. Bradley and one-eighth to Mrs. M. E. Webster, St. Louis, Mo.

807,609. PROCESS FOR HYDRATING LIME.—Carleton Ellis, Boston, Mass.

807,620. MERCURY AND AMALGAM SEPARATOR.—Henry J. Horstmann, Fort Wayne, Ind.

807,629. ARTIFICIAL FUEL.—Eugene C. May, Chicago, Ill., assignor to National Garbage Fuel Company, Chicago, Ill.

807,640. MANUFACTURE OF HYDROCHLORIC ACID.—Isaiah L. Roberts, Brooklyn, N. Y., assignor to Roberts Chemical Company, a corporation of New Jersey.

807,646. APPARATUS FOR MAKING LAMP-BLACK.—Gottfried Wegelin, Kalscheuren, Germany.

807,659. ORE SEPARATING AND CONCENTRATING MACHINE. — William P. Clifford, Iconium, Iowa, assignor of one-half to W. W. Rankin, Ottumwa, Iowa, and one-sixth to Albert B. Clinton and one-sixth to John C. Cook, Russell, Iowa.

807,661. ORE-CONCENTRATOR.—Walter S. Craven and George W. Craven, Butte, Mont.

807,683. AIR-PREHEATER FOR FURNACES.—Abraham Newton, Xenia, Ohio.

807,688. PROCESS OF TREATING RAW PEAT.—Carl Schlickeysen, Steglitz, near Berlin, Germany.

807,695. CENTRIFUGAL APPARATUS FOR TREATING GASES. — Eduard Theisen, Baden, Germany.

807,733. MOVABLE LANDING FOR THE CAGES OR CORVES IN MINE-SHAFTS.—Carl A. Eickelberg, Werne, near Münster, Germany.

807,767. VACUUM EVAPORATING APPARATUS.—Charles Ordway, New York, N. Y.

807,804. GLASS-MELTING POT.—Charles L. Betz, Rochester, Pa.

807,823. CLAM-SHELL BUCKET.—Henry P. Horn, Cleveland, Ohio.

807,850. APPARATUS FOR MARKING METAL BLOOMS, BILLETS, OR SLABS.—George E. McCaffrey, Steubenville, Ohio.

807,951. BLAST-FURNACE.—Edward P. Mathewson, Anaconda, Mont.

807,973. PROCESS OF OBTAINING MARKETABLE ELECTROLYTIC DEPOSITS.—Pierre Steenlet, Brussels, Belgium, assignor to Marcel Perrew Lloyd, Brussels, Belgium.

807,983. PROCESS FOR TREATING PETROLEUM-OILS.—Jas. P. Wintz, Sourlake, Tex.

808,043. PRESSURE-FILTER.—John L. Gray, Elizabeth, N. J.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Dec. 16, 1905.

17,407 of 1904. CONCENTRATOR.—J. D. Wolf, London. A concentrator of the traveling belt type, in which the mineral particles are separated from the gangue by means of a greasy surface on the belt, and not by concussion or gravity.

21,790 of 1904. AGGLUTINANT FOR BRIQUETS.—G. W. Goode and H. L. Mitchell, London. A briquetting composition for binding small coal, consisting of glucose, resin, etc., mixed with sulphate of iron, oxalic acid, and sulphate of soda.

3,225 of 1905. DE-COPPERING IRON AND STEEL.—W. R. Hodgkinson, London. For removing copper and nickel from iron and steel surfaces, the use of a solution of an amide of an organic acid mixed with cuprous chloride.

5,966 of 1905. OIL-WELL DRILLING-MACHINE.—R. M. Downie and the Keystone Driller Co., Beaver Falls, Pa. An improved portable drilling-machine for drilling oil-wells, etc., which will drill to considerable depths.

8,386 of 1905. PYRITE SMELTING.—R. Baggaley, Pittsburg, Pa.; C. M. Allen, and E. W. Lindquist, Chicago, Ill. A form of pyrite smelting, in which the ore is fed slowly into molten matte in a converter, the resulting moisture being afterward delivered to another vessel where the matte and slag separate by gravity.

12,300 of 1905. AIR-BLAST REGULATION.—F. Forster, Wenterthur, Switzerland. Improved method of regulating the air supply to crucible furnaces.

15,296 of 1905. TILTING FURNACE.—T. H. Treat, Pittsburg. Improved framework for supporting tilting open-hearth steel furnaces.

20,253 of 1905. ORE-HOPPER.—V. Defays, Brussels. Improved form of hopper for storing ores.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. R. W. Gordon returned to Denver from Nevada a few days ago.

Mr. R. J. Grant has returned to Denver after a six weeks' trip to Mexico.

Mr. T. I. Slater, of the Gold Anchor property at Alice, Colo., has returned from a visit to Chicago.

Mr. Hudson H. Nicholson is at present on a professional trip in the Guanajuato district of Mexico.

Mr. Clarence B. Wisner, manager of the property of the Montana Zinc Co., in Butte, Mont., is in the East.

Mr. P. B. McCoy, of Kempton & McCoy, New York, has gone to Central America, on mining business.

Mr. E. W. Sebben has been examining properties near Nevadaville, Gilpin county, Colo., during the past two weeks.

Mr. F. W. Royer returned to Denver from New York a few days ago, and left for Mexico on professional business.

Col. T. R. Marshall, of New York, has been examining mining property in the Idaho Springs district of Clear Creek county, Colorado.

Mr. Henry I. Seeman, of the Continental Mines, Power & Reduction Co., operating in the Yankee Hill district, is a visitor to Chicago.

Mr. Bertram Hunt has just returned from Costa Rica, and has opened an office in the Schmeidell building, San Francisco, as mining engineer.

Mr. F. Lynwood Garrison recently returned from Santo Domingo to Philadelphia. He expects to go back to Santo Domingo in January.

Mr. Sam. G. Adams, of Steamboat Springs, interested in the coalfields of Routt county, Colo., has returned from a business trip to Eastern points.

Mr. Carlton H. Hand, formerly manager of the Watseca property and now mining placer ground on the Snake river of Idaho, is in Spokane on business.

Mr. W. A. Butchart, assistant to the resident manager of the Mexico branch of the Mine & Smelter Supply Co., has been promoted to resident manager in the City of Mexico.

Mr. J. Walters, manager of the Evergreen Gold & Copper Mining Co., operating in the Pine Creek district, Gilpin county, Colo., is making a business visit to Missouri points.

Mr. T. G. Stroud, superintendent of the Missouri-Colorado Mining & Milling Co., operating in the Pine district of Gilpin county, Colo., has been making a visit to Rinconadi, New Mexico.

Mr. John H. Casler, president of the Grace Mining Co., of Buffalo, was last week at the company's mine at Eagle Lake, near Dryden, Ont., arranging for the continuance of operations.

Mr. Louis S. Noble, of Denver, Colo., has been appointed geologist for the Great Northern railroad. He will, however, maintain his office at Denver and continue his private practice as heretofore.

Col. Conrad, now in London, Eng., states that he has made arrangements to spend a large sum during the coming season in developing the mine at Conrad, Yukon territory, including the construction of a railway and smelter.

Dr. Henry S. Pritchett has resigned the presidency of the Massachusetts Institute of Technology to accept the presidency of the Carnegie Foundation for pensioning college and university professors, the offices of which will be in New York city.

Mr. E. H. Wilson and Mr. J. H. Trerise, who are identified with United Copper, returned to Butte, Mont., Dec. 15 from Mexico, where they went to inspect a copper property. Mr. Trerise left Butte for Zululand, South Africa, on the 18th to manage the development of a copper mine there.

Mr. Ross C. Purdy, late of the Ohio State School of Ceramics, is now investigating the paving-brick industry of Illinois on behalf of the Illinois Geological Survey. He has recently visited Danville, Streator, Galesburg, Alton and other manufacturing points, and is making a complete study of all of the clays now used in the manufacture of paving brick.

Mr. Robert T. Hill, mining geologist, has purchased the entire capital stock of the corporation known as the Hill-Cunningham Co., of New York. The corpotation will be put in liquidation, and Mr. Hill will hereafter conduct business solely under his own name, with offices in the Trinity Building, Broadway, New York. Mr. Hill expects to be in Mexico during January.

Obituary.

Robert H. Officer, a prominent Salt Lake assayer, is dead from the effects of the inhalation of poisonous gases while conducting experiments. He was formerly a resident of Colorado, and had many friends in Denver.

We regret to hear of the death, on Nov. 26, of William Henry Edgar, at the age of 40 years. He was an active and energetic business man, and made many friends. He was president and founder of the Dearborn Drug & Chemical Works, of Chicago.

Charles Esplin, well known throughout Canada in his professional capacity, died at the hospital, St. Boniface, Manitoba, Dec. 4, aged 71 years. He was born in Scotland and went to Canada when quite young. His first work was in connection with the Victoria bridge, Montreal, and he was subsequently engaged for many years in constructing bridges, mills, etc., in the Ottowa valley. He went West in 1878 and, in addition to being engaged in important engineering works, both in the United States and Canada, invented many mechanical devices, including the Esplin band-saw mill. He finally settled in Winnipeg in 1897. Mr. Esplin is survived by his wife and a large family.

J. H. Vogel died at Birmingham, Ala., Dec. 19, three days after having undergone an operation. Born at Greiz, Germany, in 1868, he studied at Geneva and Zurich, from which latter institution he received the degrees of mechanical and electrical engineer. He went to Niagara Falls with the famous Swiss hydraulic engineer, Mr. Turretini, whom he assisted in the erection of the power plant there. Later on he was engineer with the Westinghouse Electric Co., and several other concerns in this country and abroad. He then spent several years in Mexico, doing general consulting work, and was at the time of his death chief engineer of the Birmingham & Atlantic railway. He was a brother of Felix A. Vogel, general manager of the Florence Iron River Co., and its allied companies.

The death of George Stephenson, a well-known Mexican mining man, is reported in Durango, Mex. At the time of his death Mr. Stevenson was the agent in Guanacevi for smelter No. 2 of Monterrey, and for the last 16 years had represented various smelting industries in Pachuca, San Luis de la Paz and Catorce. He came of an old Scotch family, long identified with Mexico. His father, who is still living in Scotland, was the head freighter of the old English Real del Monte Co. in the first decade of the last century, and was well known in what is now the State of Hidalgo, where he was the owner of much property, among others the well-known Guajolote ranch, near Tulancingo. Mr. Stevenson was popular with all who knew him, especially with Mexicans, who highely appreciated his sterling qualities and his high character. He leaves two brothers in Durango.

Societies and Technical Schools.

National Association of Cement Users.—The annual convention will be transferred from Milwaukee, Wis., to Columbus, Ohio, owing to the burning of the Exposition building at Milwaukee. As 10,000 sq. ft. was required for the exhibits of the association, this fact made it difficult to secure adequate quarters. Columbus was finally selected. As the Governor's inaugural ball will be held on Jan. 8, the dates of the convention have been advanced one day, thus making the convention dates as they now stand, from Jan. 10

to Jan. 13, inclusive. It was not an easy proposition to secure adequate quarters, as the exhibits of machinery, cements, etc., at the convention will be usually large.

Trade Catalogues.

The Cutler-Hammer Clutch Co., Milwaukee, Wis., issues its catalogue, "Magnetic Accelerators and Couplings."

Catalogue "R" of the Mecklenburg Iron Works, Charlotte, N. C., describes and ilustrates mining machinery made by this firm.

Derrick fittings and contractors' supplies are listed in the new catalogue of the George Focht Sons Iron Works, Hoboken, N. J.

Bulletin No. 61 of the Crocker-Wheeler Co., Ampere, N. J., describe belt-type direct-current generators and motors of large size.

"The Blue Book of Rope Transmission" is the handsome publication of the American Manufacturing Co., 65 Wall street, New York.

Printing-press motors. and watch-case voltmeters and ammeters are described in two new bulletins of the Stanley-G. I. Electric Mfg. Co., Pittsfield, Mass.

The Ward Natural Science Establishment, 76 to 104 College avenue, Rochester, N. Y., sends out lists of minerals and collections for schools and scientific men.

New catalogues of the Hooven, Owens Rentschler Co., Hamilton, O., have lately been issued. These describe the Corliss engines and steam turbines made by this company.

The United Concrete Machinery Co., Broadway and Twenty-third street, New York, is distributing a series of pamphlets and catalogues describing its products, and buildings where it has been used.

Industrial.

The Roane Iron Co., Chattanooga, is rushing repairs on its No. 2 blast-furnace at Rockwood, Tenn., in order to have it ready for blowing in early in the new year. No. 1 was blown in some time ago.

The By-Product Coke Co., which has built 120 ovens at South Chicago, Ill., expects to have this plant in operation by the beginning of the new Year. Pickands, Brown & Co. have been appointed sales agents for this coke.

The Baker City Iron & Supply Co., Baker City, Ore., has been incorporated with a cash capital of $25,000 to manufacture mining and milling machinery, sheet-iron work, hoisting engines, etc. The new company succeeds the Baker City Engineering Works.

The Edison Electric Co., Los Angeles, Cal., has let the contract for lining its pressure tunnel to be constructed for the Kern River No. 1 power plant to the Risdon Iron Works, San Francisco, Cal. The main steel lining will weigh approximately 400 tons and that of the branch connections about 150 tons.

Cherokee furnace, of the Alabama & Georgia Iron Co., at Cedartown, Ga., has resumed operations after an enforced idleness of several months on account of an inability to secure wood cutters and charcoal burners. The plant produces a high-grade car-wheel pig iron, and has an annual capacity of about 18,000 tons.

The Midland Steel Co., Pittsburg, has let the contract for the iron work on its new blast-furnace at Cook's Ferry, near Beaver, Pa., to the Riter-Conley Manufacturing Co., Pittsburg. The engineering work is in the hands of George W. McClure, Son & Co., of Pittsburg, who will put in their hot-blast stoves at the plant.

The Amsler Engineering Co., Pittsburg, has just installed a battery of five of its patent gas producers for the Indiana Bottle & Glass Co., Cicero, Ind.; a battery of three for the Milgrove Bottle Co., Milgrove, Ind.; and one for the Southern Indiana Glass Co., at Loogootee, Ind. A month ago the company completed the 50-ton blast-furnace for the Northern Iron Co., Standish, N. Y., and is it now doing a large amount of reinforced concrete work.

A new 850-h. p. unit has been put into operation in the power-house of the Dominion Iron & Steel Co., Sydney, N. S., which is the largest of its type in the maritime provinces. The record for production at the open-hearth steel furnace of the company was made recently, when 902 tons were turned out in 24 hours. The company has received an inquiry for steel rails from the Klondike Mines Railway Co., which is constructing a line from Klondike City to Dawson.

One-half of the stock of the Shenango Furnace Co. and allied interests owned by the estates of Henry W. Oliver and James B. Oliver, and the Oliver Iron & Steel Co., have been sold to W. P. Snyder by George T. Oliver, Henry R. Rea, and the Union Trust Co., trustees of the estate of the late Henry W. Oliver, for $6,000,000. The sale includes a half interest in a large tract of iron ore on the Mesabi range, and 1,200 acres of coking coal land in the Ligonier region in Pennsylvania. This sales covers all the Oliver interests in the firm of W. P. Snyder & Company.

The Harbison-Walker Refractories Co., of Pittsburg, Pa., reports the demand for its products as very large and constantly increasing. Some of the larger contracts include blast-furnace linings and stoves for Midland, Pa., Youngstown, O., and Chicago; blast-furnace linings for Sydney, N. S.; Wharton, N. J.; Bethlehem, Harrisburg and Sharpsville, Pa.; Buffalo, N. Y.; Canal Dover, O., and Detroit. The company is furnishing brick for a large number of coke-ovens, including one block of by-product ovens; also a number of rotary kiln linings for cement plants. The company reports an exceedingly large demand for silica brick for open-hearth steel furnaces, glass furnaces, copper furnaces, etc., and for magnesite and chrome brick from open-hearth steel works, copper works, etc.

Construction News.

Colorado Springs, Colorado.—A plant will be erected here by the Colorado Coal & Clay Company.

Central City, Colorado.—New machinery is to be put in at the National mine. Sherman T. Harris, Russell Gulch, Colo., is manager.

Centerville, Tennessee.—A mill is to be put up on a phosphate tract lately sold. C. W. Weaver, Nashville, Tenn., is managing affairs.

Tamatave, Madagascar.—P. H. Golaz, of this place, desires catalogues of mining and crushing machinery. He intends to erect a quartz crushing plant.

Morgantown, West Virginia.—The Decker's Creek Coal & Coke Co. intends to instal electric equipment. The office is in the Frick building, Pittsburg.

Merrittstown, Pennsylvania.—The Republic Iron & Steel Co. will build 300 coke ovens in the spring. W. H. E. Royce, Youngstown, O., is engineer.

Mocksville, North Carolina.—The Gray Mining & Development Co. will put up a small mill for working gold ores. C. W. Morgan, Charlotte, N. C., is engineer.

Pine Creek District, Colorado.—The Imperial Mining & Milling Co. expects to put up a mill with a capacity of 100 tons daily; also an electric plant. L. J. Mountz, Apex, Colo., is manager.

Saltville, Virginia.—The Southern Gypsum Co. will put in plant for mining and preparing gypsum at its property on Holston river, five miles from Saltville. W. E. Cochrane, Butler, Pa., is manager.

Telluride, Colorado.—The Black Bear Mining Co. intends to put in an air-compressor, machine drills and an electric hoist. A mill will be required later. Leonard Kaenter, of Telluride, is president.

Grand Lake, Colorado.—The Eureka Consolidated Mining Co. proposes to put in a cyanide plant at its mine in the Rabbit Ear range. Jack Burns, Grand Lake, Grand county, Colo., is superintendent.

Boulder Park, Colorado.—At the Vesuvius mine, Allen Smith, of Tolland, Colo., is arranging to instal a plant of machinery as soon as surface improvements are made. The property is near Boulder Park, in Wisconsin district.

Special Correspondence.

San Francisco. Dec. 20.

Up in the northwestern counties of the State—particularly in Siskiyou and Trinity—some phenomenal finds have lately been made, which, if occurring in newer regions, would have attracted wide attention, though little is heard of them outside the borders of California. In the case of the Bonanza King mine, in Trinity county, where the Treadwells secured the property on a bond payable in one year at the price of $50,000, they have paid the sum six months before it is due, having taken out ore valued at nearly twice that in the first six months of the life of the bond. The conditions provided that no ore from the mine should be milled or removed before the $50,000 had been paid, which explains the payment before half the time elapsed. While running a tunnel, etc., a distance of 430 ft. from the mouth, they came across a narrow seam, carrying very high values in "wire gold." Many of the pieces of quartz extracted are more than half gold, running $19.50 per oz. The mine is not yet equipped, but shortly will be, and is one of seven claims recently purchased by John and James Treadwell, who opened up the Douglas island, Alaska, mines originally; W. G. Bartnett, J. D. Brown, E. M. Bradford and Jos. P. Porter, the latter being superintendent. The seven claims lie on the mountain divide between a branch of Cedar creek and the east fork of Trinity river. Outside of the rich seam, quartz taken from the tunnel runs over $2,000 per ton. The company will build a mill on the east fork of Trinity river. The mine is 3,000 ft. up in the mountain from the bed of the north fork of Trinity river. The new owners will commence two long tunnels, cutting the vein at lower depths, also construction of a stamp-mill. Cheap power is at hand in the north fork of Trinity river.

Another phenomenal gold mine is the Highland, in China gulch, 17 miles southwest of Etna, in South valley, Siskiyou county. While one of the employees was drilling a hole in the orebody of the mine, he found that it was almost impossible to make headway, and on examining he found the drilling to be mostly gold. From the drillings over $20 was panned out. A shot blew out what the owners estimate to be about $10,000 in beautiful specimens from the small drill hole. This property is the wonder of Siskiyou, and is getting richer and better with development.

Still another remarkable gold property is that of the Tightner, near Alleghany, Sierra county, recently sold to J. P. and Samuel L. Jones and A. C. Hamilton for $250,000, by H. L. Johnson, who bought it a year ago for $12,000 and in a few months took out $90,000 and subsequently sold it as stated. W. S. Haskins is now in charge of the mine for the new owners.

A mining sale of importance for this State is that of the Union mine, in El Dorado county, to Senator Clark, of Montana, by A. Harpending. The newspapers state the price to have been over a million and a half. The mine has been a large producer for years until quite recently, when its large mill was destroyed by fire, but this will be rebuilt at once. The property was at one time owned by the late Alvinzo Hayward and Chas. D. Lane, who sold it after taking out a million and a half dollars. The new owner at the 800-ft. level ran into good ore again. This is a Mother Lode property, for some years held under the individual ownership of A. Harpending.

It is reported that a deal is about to be closed for the old Big Blue mine at Kernville, Kern county, which has not been worked for 20 years, though at one time it was a producer of note. It was one of the first properties to be developed in Kern county, and a 100-stamp mill formed part of the equipment. The mine is located not far from Kern river, and when the workings were carried down to river level the water became a serious impediment.

Another rich strike has been made in the Eastwood & Weitfle lease on the Pittsburg, in Masonic district, Mono county. It is located above the first ledge cut, and the assays run very high. Ore is now being hauled to Bodie, and will go from there to Carson. The ore now being sacked is ribbon quartz, a blue streak running through the center and on each side of it carrying a heavy sprinkling of free gold, which can be plainly seen with the unaided eye.

The gold and copper districts on the Colorado river, in the Whipple mountains, in San Bernardino county (and across the river in Arizona) are now attracting attention from the recent developments in a number of claims. The Santa Fé road will be completed to the river in a few months, when shipments of ore will commence.

In the Amalie district of Kern county the mill at the Zenda is being enlarged by the addition of 10 stamps, and both the roller and stamp process will shortly be in use on that property. The mill will crush ore both from the Zenda and the Cowboy, the interests in the two mines now being largely identical. Dr. Bryson, of the Zenda, owns a half interest in the Cowboy, and A. Weill and H. A. Bloget, who own the other half, likewise have a twelfth interest in the Zenda. The 10-stamp mill for the Zada mine in the same district is in course of construction.

Bisbee. Dec. 21.

The recent finds of high-grade oxide ores in the 1,800-ft. level of the Lake Superior & Pittsburg mine, north from the Cole shaft, are especially interesting as carrying out the verification of a theory that is of the greatest importance to the entire district. It has always been considered that beneath the various bodies of leached ores copper will be found in considerable quantity, because it is considered that these leached ores are but the remains of former sulphides that have been acted upon by water and their copper contents dissolved and re-precipitated at lower elevations, wherever the water was led to part with its burden. This new find is almost directly beneath leached bodies that had been cut on upper levels, and which were of considerable extent. The absolute proving of this theory in every case where it has had an opportunity for verification, is of especial interest to the Calumet & Pittsburg, whose leached orebodies on the 910-ft. level are of the greatest extent and show conclusively the most free action of percolating waters. This ore in Lake Superior is now showing to the width of the crosscut and high in copper values. This mine is now shipping better than 1,000 tons a week to the smelter, and is making a considerable tonnage of blister copper. Its developments are being extended and the Cole shaft is now going down for the 1,400-ft. level, which it is expected to reach in about 90 days. Some water is looked for, but the pumping capacity of the shaft is quite large.

Drills are to be put at work on the American and Warren properties as soon as they can be had. It was expected that nothing would be done with Warren for a long time, other than to start the city of Warren, to accommodate the overflow from Bisbee. But it is evident the company has hopes of making a mine as well as building a city.

The Mountain View Mining Co. has made a shipment of something less than a ton of selected ore from its dump, just north of the city, to the Queen smelter at Douglas, that showed a net return of $91 per ton. The remaining 50 tons on dump will be shipped and the company expects to derive profit from all of it. This ore has to be brought down the cañon to the railroad tracks here on burro back, and the expenses are heavy. The company has a shaft 100 ft. deep, and hopes to resume work soon.

It is reported that ore has been cut in the Fenner tunnel of the Wolverine, close to the west side of the Czar fault, on the Georgia claim. The report is not authenticated and may not be true. Indeed the probability is against the find at this time. The managing director of the company will make a full report to stockholders some time in January.

The Naco Land Co. has sold all its holdings to the Mitchell Smelter Co., which is to build a large copper smelter there, for about $100,000 above all obligations. The Mitchell Co. has a large mine in Sonora, and has made contracts with many small producers in southern Arizona and northern Sonora, to smelt their ores, and will probably have its works ready

for handling about 200 tons per day during the coming summer. Naco is about six miles from this city, on the Mexican line.

The New England & Clifton Copper Co. has begun the shipment of ore running 10% and above to smelters at Clifton, and expects to carry on a steady production at the rate of from 500 to 1,000 tons per month.

In the Chiricahua mountains the Cochise property has a shaft down 170 ft. and is shipping a small amount of ore to mill. Machinery for the company's own mill is arriving at Rodeo, and will be brought in as fast as possible.

A 600-ft. tunnel will be driven on the Scanlon property at once in search of the sulphides that have been cut near the outcrop. This was a mine worked during the early days and is owned here and at Douglas.

At the Oja de Agua pumping plant the Hole mine may develop to an important property. It has been examined several times recently and the report is that work is to begin once more. Strikes have been made near-by that show well.

The meeting of Arizona mining men to organize a Territorial association, to be held at Phœnix on Dec. 23, promises to be well attended and to be of much importance to the Territory's chief industry. Mining men from all over Arizona have notified the committee of their intention to be present, and among these are some of the leading men in the business. Bisbee and Cochise county will be especially well represented.

Tonopah. Dec. 24.

Reports from Bullfrog are encouraging. Several Bullfrog mines have large quantities of ore ready for shipment, but no easy or cheap way is open. The railroad is being built as rapidly as possible. The road will make more difference to Bullfrog than it did to Goldfield, because that camp is so far away it has practically been impossible to make any shipments at all, except a few test shipments at enormous expense.

The Goldfield-Tonopah railroad consolidation is threatened with trouble from the inside, as it were. It seems that Judge McPherson, sitting in the United States Circuit Court in Philadelphia, has made an order temporarily restraining the Tonopah-Goldfield Railroad Co. from carrying out its plan of consolidation. The suit is almost identical with that brought at Wilmington, recently, by William Jay Turner. The plaintiff in the litigation before Judge McPherson is Louis Teller, of Philadelphia, who previously had asked stockholders to join him in an effort to prevent the merger.

There is a good prospect that the Tonopah & Tidewater railroad, from Ludlow, Cal., to Bullfrog, a distance of 165 miles, may be completed at an early date. This line is being promoted by F. F. Smith and the Santa Fé Railroad Co. It is of standard gauge and is already graded 22 miles, with 6 miles of track laid. Tracklaying is now progressing. The road from Ludlow will pass across the Salt lake through Soda lake and Silver lake, and pass near the Kingston mountain range and Ironwatch mountain. It will pass within 4 miles of the Great Tocopah lead mines and up the Amagosa river along the east side of Funeral range mountains. At 118 miles it will tap the Great Borax mines, on the way to Bullfrog. This road then will be built on to Tonopah, passing through Goldfield camp. It is expected that this will open up all important mineral regions. In passing through Death Valley it will be in close proximity to some of the big mines in that section. F. F. Smith, and John Demair, superintendent of the Santa Fé system, inspected the road from Ludlow to end of line on Dec. 10, and the manager will put on an extra force of men on Jan. 1, pushing the building of the road vigorously from there.

Meeteetse, Wyoming. Dec. 20.

Although practically unknown to the mining world until very recently, Kirwin, in northwestern Wyoming, has been an active camp in a small way for the last 10 years. The first stakes were set there by Harry Adams, who, in company with William Kirwin, camped near what is now the townsite on their way from Salt Lake City in 1891. The following year representatives of the Homestake Co. came from the Black Hills and staked out a large amount of ground, since which time these interests—known here as the Shoshone Mountain Mining Co. and the Galena Ridge Co.—have worked their properties continuously, and others who came later now have developed properties. Its location, 80 miles from a railway, within 3,000 ft. of the crown of the Rockies, has made the development of this camp a serious and slow proposition. The country rock of this district is porphyry—many distinct varieties, but all belonging to the eruptive class, save in a few minor instances. The mountains are very rugged and difficult, being covered with talus for 1,000 ft. from the base. These mountains are crossed at different angles by numerous veins of various widths and contained vein matter; some carry gold, silver, lead and copper; some copper and gold, and some gold only. A tunnel driven from the base of any of these mountains a distance of 5,000 ft. would have a perpendicular depth of almost 3,000 feet.

The properties of the Shoshone Mountain Mining Co., on Sparr mountain, which rises to an altitude of over 13,000 ft., are being developed under the supervision of P. W. Gates, of Chicago, principal owner. Several large veins have been exposed by development work, the Pickwick and Smuggler receiving most attention. The ores carry high values in copper, silver and gold. A tunnel in the Smuggler has reached a depth of 560 ft., following a vein carrying silver-lead and lead-carbonate. The works are wet and the ground soft, requiring close timbering. This is called the Bryan tunnel, the portal of which is 10,388 ft. above sea level.

The Galena Ridge Co., composed of Black Hills and a few Omaha and Chicago men, possesses over 1,200 acres in one group, all patented, in addition to valuable timber land and water rights. The veins outcropping on this property are large and well defined—more plainly, perhaps, than in any other part of the district, on account of the peculiar topography of the property. There are five known veins. A tunnel run on one of them—the Oregon—follows the vein for 450 ft. The ore is quartz, carrying gold, silver, lead and copper. Several years ago a shipment was made to the Denver smelter. After hauling the ore by wagon to Red Lodge, Montana, a distance of 140 miles, and paying all expenses, including smelter charges, the shipment netted $190. The Galena Ridge people are driving a 5,000-ft. crosscut tunnel from a low point on one side of the property to explore the property. When completed the intended distance it will have a depth of 2,800 ft. It is 8 by 8 ft. in the clear and is now in 1,400 ft. Little or no timbering is used, the formation being solid and self-supporting. Two shifts are employed, and about 40 ft. a week made. Machine drills are used, the power being air supplied by a 10-drill compressor operated by a Pelton water-wheel using 60 gal. per second under a 90-ft. head.

The Wyoming Mining Co., represented by C. L. Tewksbury, one of the oldest operators in the district, is perhaps the pioneer in the matter of development work, having mined and shipped by wagon train several cars of ore to a smelter at Helena, Mont. There is another car now ready for the Denver smelter. This ore is mined from a drift leading off from the bottom of a 250-ft. incline shaft. The vein is 5 ft. between walls, the pay-ore ranging from 1 to 4 ft. in width. Neither the ore nor the values are uniform; some of the ore contains a high percentage of gold, silver and lead, while in other places iron and copper sulphides predominate, no lead being in evidence. The values generally run high. Free gold is seldom found, even in the richest ore, although in another property on Dundee mountain, bonded by Mr. Tewksbury, a heavy find of free gold has just been reported. This mine is equipped with a steam hoist and a 6-drill air compressor and a complement of cars and buckets. The works of this company have attained the greatest depth of any in the camp.

Kirwin district has timber in abundance, and plenty of water power. Coal deposits are within 10 miles of the camp. The promised branch of the Burlington road to

Kirwin from its present Yellowstone Park line is expected soon. Kirwin is 35 miles from Meeteetse, on Wood river, a tributary of the Grey Bull river, which empties into the Big Horn. A grade of less than 1% can be had up these streams to a point within a short distance of the town.

Denver. Dec. 22.

The directors of the Exposition Mines & Leasing Co. have decided to at once start the construction of a mill in the place of the plant which was burned a short time ago, after being in operation only a few weeks. This, however, had been sufficient to show success in the extraction of the values from their ores.

A transfer has been placed on record of all the property of the Gold Belt Consolidated Electric Co. It is generally believed that the Colorado Light & Power Co., which has a large plant in operation at Cañon City, is the purchaser.

The Telluride plant, near Colorado Springs, which was purchased by the Golden Cycle Mining Co., will at once be remodeled under the direction of Philip Argall at a cost of about $150,000. It will probably take about six months to make the necessary alterations and improvements.

The American Smelting & Refining Co. is increasing the capacity of its Arkansas Valley plant at Leadville to a capacity of about 2,000 tons daily.

A large amount of silver bullion passed through this city, a couple of days ago, on the way to Asia, by way of San Francisco. It is stated here that $13,000,000 worth will be shipped in that manner. The Wells-Fargo Co. had this consignment.

News has just been received here of the death at Tonopah, Nevada, of Charles G. Kennison, who was quite prominent during our labor troubles last year, being at the time president of the Miners' Union at Cripple Creek.

It is the purpose of the management of the Denver, Northwestern & Pacific railroad to push construction from different points on the proposed line toward Salt Lake City. The exact route beyond Gore Cañon is not yet announced and will not be until the necessary rights of way have been secured.

Sixty-nine cars of ore and concentrates, containing about 1,500 tons, were shipped from Black Hawk to the Denver smelters during the first week in December and the record of Gilpin county is expected to be heavy this month.

The Colorado & Southern Railroad Co. expects to spend about $2,000,000 for the purchase of new equipment during 1906, besides that which has not been delivered as yet on 1905 contracts.

George A. Suffa has filed suit in the district court, requesting an injunction restraining the officers of the Big Five Mining Co. from selling stock and asking for the appointment of a receiver. This promises to be an interesting litigation.

Leadville. Dec. 22.

The record for the Ruby mine, Twin Lakes district, for the season has been a successful one, and the amount of first-class ore shipped has amounted to two carloads per month; the last carload was sent to the smelter during the week. As the mine is situated above timber-line, only a small force will be worked during the winter months, and they will be kept on development work. The ore taken from the mine during the winter will be stacked on the dumps. Next summer it is the intention of the owners to erect a mill to treat the large body of low-grade ore in the property, which will not stand the heavy cost of transportation. Two or three other properties will continue at work during the winter.

The dlifferent mines on Jonny hill are turning out a quantity of good ore and from No. 2 shaft of the Ibex the lessees are shipping in the neghborhood of 7,000 tons per month. It frequently happens that rich pockets are found in the mass of low-grade silicious ore. The bulk of the men at work on the mine are doing very well, and are reaching out into new territory. With the steady advance in the price of copper attention will be given after the first of the year to the lower level of No. 4 shaft, where some good copper was found when the shaft was being sunk; this part of the mine will be thoroughly prospected. From the Gold Basin 50 tons daily of $15 per ton silicious ore are going to the smelter, and development work on the lower levels is being kept ahead. From the Golden Eagle 25 tons daily of excellent grade are being shipped. The new shaft on the Silver Nugget, southeast of the Jonny, is making good progress.

No better sign of the future prosperity of Leadville can be found than at the Arkansas Valley smelter where important improvements are being made; new furnaces are being erected and the old ones remodeled, and a dozen new roasters are being installed. This conclusively proves the confidence the smelting trust has in the future of the camp. When all of the improvements are completed the smelter will be the largest in the State and will be able to treat 2,000 tons of ore daily.

A few weeks ago ore was struck in the lower level of the Evelyn, Graham park, and since then the streak has been followed; although rich it is so small that steady shipments cannot be made, but the management is of the opinion that when another 100 ft. are driven the main orebody should be reached. The Evelyn is on the trend of all of the large oreshoots from Carbonate hill.

A station is being cut at the 500-ft. level of the Mammoth shaft, and when completed the balance of the shaft will be sunk about 75 ft., when the ore opened by the diamond drill will be caught.

Butte. Dec. 19.

Anaconda has crosscut its main vein on the 2,200-ft. level and is now driving toward it 200 ft. deeper. The orebody at the point of intersection is 50 ft. wide, being as strong and valuable as it was in the upper levels, demonstrating that the copper veins of the district have great depth. This is the lowest point at which a copper vein here has been opened. Part of the mineral in it is high grade and the remainder is average, which is a characteristic of the ore found above. It will be some time before the crosscut on the 2,400 taps the lead.

The property of the American Copper Co.—comprising 20 or 30 claims in the Butte district, Montana Coal & Coke Co. and the Balakalala mine in Shasta county, Cal.—is receiving attention in Butte. This is the company organized recently by Joseph A. Coram, of Boston, and others. The company has a lot of good claims, one of which is the Baltic, and another the Smokehouse. The Baltic adjoins the Moonlight, one of the heavy producers of the Amalgamated, being directly west of it, while the Smokehouse adjoins the Baltic on the west and takes in a large section of the business part of the city. All of the claims under the control of the corporation are being put in shape for active development. Duncan McVichie, manager of the property of the Bingham Consolidated in Utah, is to be general manager of mines for the company here.

At the Lexington property, controlled by United Copper, operations are being confined to the upper levels. The mines are yielding some copper ore. The workings contain 950 ft. of water, which prevents work below the water level. The main vein of this mine is silver-gold bearing, but alongside of it there is a stringer of copper ore, which has been traced 75 ft. west of the main working shaft. It is not a case of the vein merging into copper below, for the bottom of the 1,500-ft. shaft has not been seen since 1893, in which year the Lexington Co. ceased working its silver-gold ores. The copper ore extends east of the shaft and probably continues downward with the silver-gold vein. It carries considerable zinc in places.

An effort is being made to reorganize the old Blue Bird Co., Ltd., and call it the West Butte Co., but whether it will be successful remains to be determined. The property is three miles west of Butte. It was equipped with a 90-stamp mill, which has been torn down and sold in sections. The main shaft is 500 ft. deep. The property is in charge of Fred J. Rowlands; most of the stockholders are Englishmen.

Salt Lake City. Dec. 23.

During the week the management of the Utah Copper Co. let a contract to the Minneapolis Steel & Machinery Co. for the principal buildings of the first unit of

its proposed concentrating mill, in which the monzonite copper ores of its Bingham mines are to receive treatment. This unit, when completed, will have capacity for the treatment of 3,000 tons of ore per day. There are to be three quite extensive structures put up right away. The main concentrator building will cover ground space of 300 by 508 ft. and will include the coarse and fine ore-crushing departments, ore-bin and table sections. The next largest building will be the machine shop, 50 by 150 ft., and of steel frame and brick walls, while the warehouse will be 50 ft. wide and 105 ft. in length and entirely of steel. The management has announced that the first unit is expected to be ready for commision not later than Oct. 1, 1906. Immediately following the completion of the first unit, the construction of the second will be undertaken. The arrangement of the site is such that the plant can eventually be brought up to 12,000 tons daily capacity. That there would not be any trouble in supplying this amount of tonnage, officials of the company declare there is not the slightest doubt; that the most serious problem with them is the providing of railway facilities for the transportation of the ore. But this is being undertaken by the Rio Grande Western railroad. Within a year the Utah Copper should have facilities, including the plant now in operation in lower Bingham cañon, for treatment of 7,000 tons per day. The present mill has been handling an output of about 20,000 tons monthly during the past year. The company is preparing to open up the mine for the economic extraction of ore by the use of steam-shovel and open-cut methods. The first steam shovel will go into commission shortly after Feb. 1. At about the same time the adjoining property will begin using the same methods of mining.

No denials have been made to the rumor that has gained currency in Salt Lake to the effect that there is a deal pending for the amalgamation of all the principal producing mines of Park City with the possible exception of the Silver King; some are of the opinion that that property is also to be included. The Ontario, Daly West, Daly Judge, Little Bell, Daly and West Quincy are mentioned as being included in the proposed consolidation.

The directors of the Utah mine at Fish Springs have declared an extra Christmas dividend of $1,000, making $6,000 paid during the year.

The Lower Mammoth Mining Co., operating in the Tintic district, has contracted next year's output to the Ohio & Colorado Smelting Co., at Salida, Colo.

An order of the Supreme Court of the United States has postponed until the latter part of January, the hearing of the case of Joseph Stickney *vs.* the Highland Boy Gold Mining Co. The case involves the constitutionality of an act of Utah granting the right of eminent domain for the purpose of promoting mining operations.

It is stated on very good authority that litigation is about to be instituted against the Silver King Mining Co. operating at Park City, by James McGregor and associates, who will allege trespass and unlawful extraction of ore of the value of several hundred thousand dollars.

The Daly West Mining Co. at Park City has been extracting some high-grade ore from a large shoot opened up not long ago on the 1,500-level and at a point not more than 200 ft. from the side line of the Daly Judge property. The management of the latter contends that this shoot continues on into the Daly Judge territory.

Duluth. Dec. 21.

The shipments of iron ore by the Oliver Iron Mining Co., the mining branch of the United States Steel Corporation, from its mines in the Lake Superior region, have been as follows for two years past:

MENOMINEE RANGE.

Mine.	1904.	1905.
Aragon	374,944	423,261
Chapin	541,324	902,628
Columbia	.....	27,883
Mansfield	79,173	38,594
Michigan	.....	58,233
Riverton	81,543	82,611
Iron Ridge	.....	37,233
Total	1,076,984	1,570,433

MARQUETTE RANGE.

Bessie	.....	21,879
Hartford	179,980	322,364
Lake Superior	590,339	729,192
Queen	311,479	253,376
Volunteer	71,870	106,281
Champion	174	64,680
Total	1,153,842	1,497,772

GOGEBIC RANGE.

Atlantic	77,224	208,039
Aurora	212,920	541,223
Norrie	618,638	987,590
Tilden	204,581	192,203
Total	1,113,363	1,929,055

VERMILION RANGE.

Chandler	422,162	365,739
Pioneer	505,432	653,682
Savoy	74,866	342,995
Soudan	70,713	205,002
Zenith	86,557	109,818
Total	1,159,730	1,677,236

MESABI RANGE.

Burt	1,415,884	1,861,680
Clark	256,873	358,869
Chisholm	130,732	232,733
Glen	280,412	289,559
Hull	.....	233 775
Monroe	.....	13,730
Tener	.....	58,136
Morris	.....	1,071,316
Myers	.....	188,627
Pillsbury	.....	162,058
Rust	.....	272 451
St Clair	26 748	61,792
Sellers	207,990	262,205
Adams	940,105	1,140,984
Duluth	149,819	142,172
Fayal	975,102	1,358,922
Genoa	244,150	281,061
Spruce	589,319	606,295
Mountain Iron	1,168,855	2,500,570
Virginia	5,395	402,224
Higgins	35,286	239,435
Stephens	.....	366 264
Total	7,426,670	12,104,878
Total all mines	11,930,599	18,779,374

The Burt shipments in 1904 included the total from the Hull, Rust and Burt; those from the Virginia included the ore from the Oliver and the Ohio.

The increases in 1905 over 1904 were: Menominee range, 493,449 tons; Marquette, 343,924; Gogebic, 815,692; Vermilion, 517,506; Mesabi, 4,678,208; total, 6,848,785 tons, or 57.4%. The Mesabi furnished 64.5% of the total this year.

Platteville, Wis. Dec. 24.

One of the biggest strikes in the Platteville district that has been reported for some time was made during the week at the Cardiff Coal Co.'s property, in the Potosi camp. At a depth of 206 ft. an extensive body of ore was encountered, the thickness of which is not yet known.

Messrs. Spensley, Allen, McIllon and W. A. Jones report the finding of a rich body of ore at a depth of 108 ft., extending through the clay bed and into the glass rock, on their lease, which is located on the Nolan property, in the Mifflin camp.

In the vicinity of the Clayton property, Messrs. Cushman and associates recently discovered a large vein of zinc and lead ore at the same depth, which is supposed to be the continuation of the Old Penitentiary range.

The Empire paid its usual dividend the first part of the week. There is considerable talk as to the opening of a mining exchange.

The new concentrating mill erected by the Galena Iron Works Co., at the Baxter mine, for the Janesville Co., was started up recently. The output exceeded the expectation of the owners. The finished heads from the mill average close to two tons per hour, of such a grade that no roaster will be necessary to prepare same for the market.

The Benton Development Co. is considering the advisability of installing hoisting and pumping machinery, having struck paying ore in the majority of their drill holes. The company is composed principally of local parties. M. A. Coltman, of the Benton camp, has direct charge.

The reports from the Rewey camp are quite encouraging. New strikes are being made with the prospect drills, and the shafts that are being put down are proving to be all that the drills showed, and in several instances considerable more.

The discovery of zinc ore in paying quantities below the "glass rock" in the vicinity of the New Diggings camp, reported in the JOURNAL some time ago, has stimulated other operators to look for the ore at greater depths. The results are satisfactory so far. The Kennedy people, at Hazel Green camp, report a large body as being encountered while sinking their shaft below the glass rock.

Eight new prospecting companies are reported as being organized during the week.

Pittsburg capitalists, represented by Dr. Johnson, are preparing to begin mining operations on the Brown property, joining the Black Jack on the west, near the Galena camp. This location is considered

one of the most likely pieces of mining property in the camp.

The Black Jack Co. expects to begin operations soon, and has made all necessary arrangements for the installation of heavy pumping machinery, which is required by the large flow of water found in this locality.

Scranton. Dec. 26.

So far as the public is informed, no action has been taken upon the resolution of the mine-workers at Shamokin, inviting the operators to meet in conference to settle the terms of the new agreement. It is generally accepted, however, that the operators will avail themselves of the opportunity to insure peace, and that Hon. W. J. Connell, president of the Conciliation Board, will be the intermediary between the two sides. Mr. Connell has been remarkably successful in gaining the confidence of both miner and operator under very trying circumstances.

During the past week stories have appeared in the metropolitan papers in connection with the alleged stocking of coal in the anthracite field, it being stated that this was done in view of the probability of a strike in April next. The statement was made that, whereas during the past two years the total stock did not amount to more than 2,000,000 tons on April 1, it will on April 1 next amount to 10,000,000 tons, and that at present the stocks exceed 6,000,000 tons. Special inquiries were made by the correspondent of the JOURNAL, the result of which shows that the total stocks of anthracite coal are less today than for many years at the same period. The demand is remarkable, in view of the open winter, and a number of the companies have been unable to meet the orders for the large sizes. All the companies asked their men not to lay idle this week except on Christmas day, owing to the active state of the market. The Lackawanna on Saturday last had no more than 50 carloads of coal in stock, although in the metropolitan papers it was credited with 600,000 tons. All the other companies, although they have more or less small coal on hand, are rapidly disposing of their stock.

A most important step was taken in connection with the responsibility of miners for the safety of their laborers at an inquest held last week in Wilkes-Barre. George Mergo, a laborer, was killed by a fall of roof in the Midvale slope, of the Lehigh Valley Coal Co., and, at the inquest, it developed that the miner, Andrew Varilla, had been notified that the roof of the breast was dangerous, and was ordered to prop it. He disobeyed the order and fired a blast and went home, leaving the laborer to load the car. The roof fell and the laborer was buried underneath tons of coal. It has been the custom in the anthracite field for the miner to leave the mine as soon as he has blasted sufficient coal, rarely working for more than three or four hours a day, leaving the laborer to do the burden of the day and to pass nine hours in the chamber. Some of the companies have endeavored to force a rule compelling the miner to remain in the chamber while the laborer is there, but with indifferent success. The recent inquest demonstrated the wisdom of the rule and four mine inspectors were present —Boyle, McDonald, Walsh and Martin— and as a result of the disclosures, they determined to ask the district attorney to prosecute Varilla for criminal neglect. The case will be watched with great interest, as upon the result will hang the question whether the miners of the anthracite field shall work three hours or nine hours each day.

The Dodson Coal Co. has purchased the Hooker colliery at St. Clair. It already operates the Kaskawilliam colliery, six miles east of the Hooker colliery, and between these two points owns a valuable and extensive tract of virgin coal which is to be mined at an early date.

The Schuylkill Coal & Iron Co. is still acquiring coal lands, having last week purchased a small tract in Branch township, known as the Frederick Hesser tract, adjoining other tracts recently bought.

A new colliery is to be opened at Alden between the Alden and the Bliss colliery, of the Lakawanna. There are a number of veins and it is claimed that the big 30-ft. vein is intact. Plans are being prepared for a breaker with a capacity of 500 tons and, by the time it is completed, the mine will have been opened up and the gangways driven and all in readiness for the shipment of coal.

Toronto. Dec. 24.

A nugget of almost pure silver weighing 250 lb., has been found on a property near Giroux lake, in the Cobalt mining area, owned by A. M. Wylie, of Port Arthur, and J. B. Pardee, of Sault Ste. Marie, Ont. Along with it were found two smaller nuggets of about 30 lb. each. The big nugget was placed on exhibition at the Imperial Cobalt, Cobalt. Mr. Hanson, representing American capitalists, has purchased McLeod & Glendinning's claim at Cross lake for $250,000, and put a number of men at work on it. The diamond drill in operation at La Rose mine is down 340 ft. and the vein is found to be holding out well.

An important strike of gold at the Laurentian mine, in the Manitou gold area, near Wabigoon, is reported. The mine has only recently been re-opened and blasting operations in the course of drifting from the north side of the shaft at the 85-ft. level displaced large masses of rich ore.

E. T. Corkill, Ontario inspector of mines, who has just returned from a tour of inspection in the Algoma district, reports that the Superior Copper mine has put in a new concentrating mill with an estimated capacity of 60 tons per 24-hour day. The ore is crushed to 10-mesh dimensions by a jaw crusher and high-speed rolls, sizing by means of a shaking screen. The plant includes a three-compartment hydraulic separator and four No. 4 Wilfley tables. The Breitung iron mine is shipping about 150 tons of ore per week to the furnace at Sault Ste. Marie. Diamond drilling is to be commenced at once to test the depth of the orebody. Considerable development work has been done during the open season on the Whiskey Lake copper properties and cobalt bloom has been found. Carnegie Williams, engineer in charge of the Bruce copper mines, expects to begin mining operations during the winter. At the Herminia copper mine a new shaft 15 by 7 ft. is being sunk on No. 3 vein. Hoisting machinery and a compressor plant have been installed. The new arsenic plant at Copper Cliff for the treatment of cobalt ore is ready for operation. The Elmore oil plant at the Massey Station copper mine has treated about 3,500 tons of ore during the summer, effecting a recovery of copper of from 75 to 80% from less than 3% ore. Diamond drilling and stripping operations, undertaken by the Canadian Copper Co. at Krean hill, in Dennison township in the Sudbury nickel area, have resulted in uncovering a very good body of pyrrhotite. The Shakespere gold mine, at Webbwood, has been running its stamp mill continuously during the summer, obtaining good results.

Sudbury. Dec. 24.

The Sudbury delegates to the mining convention held in Toronto have returned and report that the resolutions presented to the Minister of Lands and Mines were similar and along the lines laid down at the local convention here. Opinion seemed to be unanimous against the imposition of a royalty or tax on mines. Some of the veteran prospectors of the district complain of the time usurped by Toronto speculators and lawyers at the convention. The defeat of R. R. Gamey for the chairmanship showed at once that the urban element was in the preponderance, and the Province now awaits the outcome of their deliberations, some of which, it is expected, will be crystallized into law at the coming session of the legislature.

The first pig of iron has been shipped from Sault Ste. Marie to the Dominion government by Dr. Heroult, made by his electric process. He seems to be of the opinion that there is no doubt as to the process where there is an abundance of cheap power. The reason assigned by him for the disadvantages of the process in England and France is the scarcity of power and the high prices paid for same. Here, in Canada, where there is a superabundance of power not in use, which can be produced at $5 to $10 per horsepower year, there is a difference.

The Board of Trade at Sault Ste. Marie

has deputed F. H. Clergue and other gentlemen to appear before the Tariff Commission at its session in Sault Ste. Marie with the view of having the duty removed from coal for coking purposes.

The corporation of the town of Sudbury has granted a charter to a company, of which Major J. R. Gordon is in charge, permitting the company to operate and construct an electric street railway from the town of Sudbury to Copper Cliff; also granting them the privilege of selling power for other than lighting purposes. The company is at present possessed of power sufficient for this purpose and was a competitor for the town lighting some time ago, when the contract was awarded to Cochrane & McVittie.

The deputation from Sudbury that waited upon Messrs. McKenzie and Mann last week at Toronto were assured by these gentlemen that their line of railway running north would certainly connect with Sudbury, and that a branch line would run into the township of Hutton, tapping the iron range known as the Moose Mountain range.

The Department of Lands and Mines contemplate the cancellation of some two hundred mining leases, principally in the Rainy River district. It would seem that in many instances the rentals have remained unpaid for many years. This will throw upon the market many prospects that have for years been virtually tied up.

Victoria, B. C. Dec. 23.

Slocan.—Geo. F. Ransom, manager of the Payne mine, has telegraphed from Iola, Kan., that the suit of the Lanyon Zinc Co. vs. the Payne Consolidated Mining Co. has been withdrawn, each party to pay its own costs. The Lanyon Co. has brought action against the Payne Co. to recover $1,700, claimed to have been overpaid on ore shipped by the latter company to the smelter of the former at Iola. The Payne Co. then filed a cross suit for $2,500 for damages claimed to have been sustained in that the Lanyon Co. had not carried out its part of the ore-shipping contract by advising the Payne Co. as to the proper method of installing machinery for the advantageous concentration of its ores.

Ferguson. (*Lardeau*).—The Ferguson Mines, Ltd., a British incorporation, owning the Silver Cup and Nettie L. groups, and a reduction plant, all in the neighborhood of Ferguson, northern Lardeau, is carrying out a comprehensive scheme of development work, including the driving of a tunnel 700 ft. below the upper workings of the Silver Cup mine, to thoroughly explore this property at depth. About 2,000 ft. of this tunnel has been driven, and a raise made to connect with an intermediate level, between 300 and 400 ft. above. This development appears to have proved that the orebodies are permanent at depth; high-grade ore, running more than 200 oz. silver, 0.5 oz. gold, and heavy in lead, in shoots apparently of good size, having been encountered by this deep tunnel.

Rossland.—A disastrous explosion took place at the Center Star mine on Saturday afternoon, Dec. 16. As the foreman blaster, John S. Ingram, stated to have been the only man who could otherwise have given information as to the cause of the explosion, was instantly killed, no particulars have been made public other than that from 1,000 to 1,500 lb. of gelignite exploded in the thawing house. Fortunately there was only the one fatality, but numbers of people were injured. Several members of the office staff and men in the compressor building were hurt by flying glass or by having been violently thrown against the machinery. The disaster has necessitated the closing down for a few days of the Centre Star and the adjoining War Eagle and Le Roi mines for repairs, compressor machinery and steam and air pipes having been damaged, and the compressor building of the several mines practically wrecked.

It has been announced that a contract has been let for sinking a winze from the 1,550-ft. level of the Le Roi mine to 1,750 ft., at which a level will be opened. In the neighboring Centre Star min the main shaft has been deepened to the eleventh level, which is 1,530 ft. on the incline below the collar of the shaft. A station is being cut at this lowest level and preparations for exploration are in hand.

Boundary.—The Dominion Copper Co., Ltd., of New York, which last summer took over the mining properties in the Boundary that for some time had been operated by the Montreal & Boston Consolidated Mining & Smelting Co., Ltd., also of New York, and the smelting works at Boundary Falls, of the Montreal & Boston Copper Co., is further developing its Brooklyn, Idaho and Rawhide mines, situated at Phœnix, and is taking out about 360 tons of ore daily from its Brooklyn, Stemwinder and Sunset mines. The main shaft of the Brooklyn has been deepened from 350 to 430 ft. and sinking is being continued. Ore is being stoped at the 250-ft. level, with a daily output of about 250 tons. On the Idaho an adit is being driven, starting from a point about 35 ft. above the Great Northern railway. At the extreme south end of the Brooklyn 250-ft. level, in Idaho ground, a raise at 30 ft. up ran into a body of chalcopyrite, with an irony gangue, an ore easily smelted. No development work is being done in the Stemwinder, but some 50 tons of ore are being stoped daily from the 114-ft. level. At the Rawhide two more quarries have been opened in ore since the company commenced operations, and an adit has been driven 100 ft., and from this a 40-ft. raise was made, the upper part in ore. An air compressor, to have a capacity of 500 cu. ft. of free air per minute, has been ordered from the Allis-Chalmers-Bullock Co. for this mine. More open quarries have been started at the Sunset, in Deadwood camp, and some 60 tons of ore are being sent to the smelter daily. No underground work has yet been done in this mine by the Dominion Co. One furnace was blown in at the smelter on Nov. 27, and the second is about ready for blowing in. When the company took possession of this smelter after it had been idle for months, it was found, so the stockholders have been informed by circular letter from the New York office, that "not having been properly cared for, it was in an unsatisfactory condition and required extensive repairs." Further, it was stated that "it was not properly located nor equipped to treat the ores economically for any great length of time." However, the management having decided, acting under the advice of the general manager, Samuel Newhouse, and the consulting engineer, M. M. Johnson, to ascertain as nearly as possible the character and volume of the ores in the various mines acquired, and thereupon to determine the most expedient methods of handling and treating these ores, to operate the smelter, for some time at least, in order to arrive at accurate and reliable conclusions in regard to these matters. Thos. R. Drummand is superintendent of the company's mines, and W. C. Thomas of its smelter.

Mexico. Dec. 20.

The recent activity in the various mining districts of the State of Jalisco has been instrumental in enabling José S. Diaz, this past week to reorganize his smelting company in Guadalajara, known as the Guadalajara Metallurgical Co., and Diego Moreno, president of the Bank of Jalisco, has accepted the presidency of the reorganized company. It is understood that $300,000 Mexican has been raised as a working capital, and in addition to the present 100-ton lead furnace, a 100-ton copper furnace will be added.

In Durango, Geo. E. Fitzgerald, formerly with the International Smelting Co., El Paso, Texas, has taken the management of the American Mexico Mining & Development Co., in place of W. S. Dillon, resigned, while the latter, associated with G. F. Grove, former secretary and treasurer of the American Mexico Mining & Development Co., has taken up a number of promising mining propositions at Trinidad, over the range from San Lorenzo and organized into the Republic Mining Co., of Chicago, with $3,000,000 gold capital.

London. Dec. 16.

The shareholders in Fraser & Chalmers, Ltd., have received a reduced dividend this year, owing to the failure on the part of the Alis-Chalmers Co., in which Fraser & Chalmers holds a large share interest, to pay any preference dividend. It will be remembered that, four years ago, when

the Allis-Chalmers consolidation was effected, the English and American businesses of Fraser & Chalmers were severed and the English company made independent of the American combine. The price paid by the Alis-Chalmers Co. to Fraser & Chalmers, Ltd., (the English company) for its American business was £255,000 in cash and $1,500,000 in 7% cumulative preference shares in the Allis-Chalmers Co. At the time I mentioned that the English company had made an excellent bargain, for it got rid of an American business that had given it a lot of trouble, and had received a big price. The sum in cash was expended in the practical extinction of the debenture debt, and for three years the company received £22,000 a year from the shares in the Allis-Chalmers Co. Owing to the necessity of spending, out of profits, large sums on reorganization, the Allis-Chalmers Co. has not been able to pay any dividends during the past year, so that Fraser & Chalmers have had to rely solely on the profits of their own business for the provision of a dividend for their shareholders. These profits for the year amounted to £28,000 and a dividend of 7% was declared, instead of 10% during the previous three years. Of course the Allis-Chalmers Co. will soon resume dividend payments, and as the preference shares are cumulative, Fraser & Chalmers will benefit eventually.

The Cape Copper Co. has had a very good year, owing to the larger quantities of ore treated, their higher grade, and the increased price of copper. The total profit was £263,000, or £80,000 higher than the previous twelve months. During the year 19,000 tons of ore averaging 15.3% copper were obtained from Ookiep mine, together with 587 tons of slime averaging 9%. At the Nababeep mine, 52,000 tons averaging 5% were obtained. At the Ookiep mine the reserves are only 6,000 tons averaging 21%, and developments do not proceed very encouragingly. At Nababeep the reserves are 150,000 tons, but very little has been discovered during the year. As the mines have been worked for over 40 years, it has become necessary to prosecute developments more actively. Several properties in the neighborhood are being opened up, and investigations have been made in connection with properties in Natal and Zululand. Properties have also been investigated in Chile and Spain, and at the present time a working option is being exercised on a property in America, but I will not mention its name, for obvious reasons. The company also derives a profit from the Tilt Cove mines in Newfoundland, but not on the scale that was originally expected. It should be added that in order to prepare for the acquirement of new properties, the company has an accumulated balance in hand of nearly £200,000.

The Sulphide Corporation, owning the Central mine at Broken Hill, is about to form a subsidiary company for the purpose of conducting its zinc smelting business in England. It is probable that the company will acquire the Emir works at Neath, South Wales, for the purpose. It will be remembered that this company has smelted zinc concentrates produced by the magnetic process of separation for three or four years, producing over 300 tons of spelter per annum. Now that the zinc problem has been taken in hand on a large scale by the Zinc Corporation, it has become necessary for the Sulphide Corporation, which is not a party to any agreement with the Zinc Corporation, to take active steps to protect its zinc production. It is not in a position to provide any more money out of capital or revenue, such as would be wanted for the establishment of a large zinc smelter, as all its available funds are required for rebuilding the lead concentration plant and providing a new concentration plant for the zinc tailings. Hence the necessity for forming a separate company and subscribing new capital. Owing to the scarcity of fireclay for retorts in Australia, it is deemed best to remove the zinc smelter to England, instead of continuing operations at Cockle Creek as heretofore. As regards the process to be adopted for concentrating the zinc tailings, it is not intended to abandon the magnetic process entirely but to supplement it by one of the flotation processes, of which the De Bavay appears to be prime favorite at present. The Sulphide Corporation has large reserves of ore, no less than 3,500,000 tons being blocked out above the 800 ft. level. The amount treated annually is about 220,000 tons and it averages 16½% lead, 18½% zinc and 11½ oz. of silver. Lead concentrates are produced to the amount of 42,000 tons a year, averaging 60% lead, 10% zinc and 29½ oz. of silver per ton. By magnetic concentration about 22,000 tons of zinc concentrates are produced, averaging 40% zinc, 12% lead and 13½ oz. of silver per ton. At the present time not a tenth of the concentrates are being smelted, the actual figures being 1,470 tons per annum.

Paris. Dec. 9.

In view of the short stocks of coal in sight in France and on the Continent generally, it is considered that prices will rule higher this coming winter than for several years past. An increase of 40 to 80c. per ton is spoken of. Some few years ago attempts were made to place quantities of American house coal in France and these endeavors met with partial success, the prices ruling then, however, being 20 and 40c. below the price of American coal delivered on wagon in France. With the present shortage and consequent high prices, it might be interesting for American shippers to enquire into the matter at the present time with a view of making considerable imports of American coal into France during the coming winter.

With the discovery of workable coal seams in the Lorraine district (east of France) at a depth of 600 meters, applications are now being entertained for concessions to open up mining in this district.

The question of ferro-silicon is occupying attention here at the present moment. The price is ruled by a syndicate, and there is little on the market. All the makers have disposed of their product up to the end of the ensuing year. Ferro-silicon of 50% and even 75% content might find a ready sale, if prices were reasonable. In Germany silicon-carbide is being used in large quantities in steel works, and is competing somewhat with the first-named product.

In view of the expiration of the Héroult patent (Froges method) determined efforts are being made by the larger aluminum companies to obtain control of the market. Several additions in capital stock are announced, the Aluminum Industrie Aktiengesellschaft having just increased its capital, by 10,000,000 marks, to a total of 26,000,000 marks. This company has three large works, in Germany, Switzerland and Austria, respectively, and its output until recently was 3,500 tons per annum. The French Electrometallurgical Society (Héroult patents) has now increased its capital to 8,000,000 fr., and has works with a total of 25,000 h. p. The present output of the French bauxite deposits, the quality of which is unequaled, is estimated to be 140,000 tons per annum, the larger part of which is exported. The price of this material (before transport) is about 9 fr. ($1.80) per ton.

The past year has been very favorable for the majority of French metallurgical companies, and dividends have been maintained at the level of those for 1904. Most of the annual general meetings have been now held and there is a general note heard throughout, to the effect that to maintain the present strong situation of the concerns, new and up-to-date tools must be used. This, of course, implies that the machine tools will mostly come from the United States and Germany, although principally from the former. It must not be thought, however, that the companies in question will lay out a large immediate sum in the purchase. The French system of dealing with these matters is very cautious, and the necessary expenses will be met out of profits, which may be generally restrained next year for this purpose. Thus the expense may be extended over several years. However, an energetic representation of American machines at the present time would undoubtedly come in for a fair share of success, as competition will surely compel many companies to take up new methods in the near future.

Negotiations are going forward more rapidly than hitherto between the French and Swiss governments, relative to the piercing of the Faucille tunnel, a work which is to rival the Simplon in its results.

Johannesburg. Nov. 9.

Shares are lower now than they have been for many months. There is little prospect of any change in the immediate future. The agitation against Chinese labor on the Rand in England, and the fiasco of the Madagascar boom, are probably the chief causes of this unsatisfactory state of affairs. People are beginning to question whether Rand stocks are not too high, even at the prevailing reduced prices. A man desirous of investing his money in a Rand gold mine would have some difficulty in finding a share that would yield a fair percentage and pay back his capital, if he bought at present prices. The investing public in Europe seems to have come to the conclusion that although the mines of the Rand offer the safest investment in the mining world, it is possible to give too high a price for this security. There is no mining center in the world where the future possibilities of a mine can be ascertained with such accuracy as on the Rand. An investor can tell very closely whether the price of a share is too high.

The speculative mines are, of course, a different matter. Some of them have no intrinsic value, and are only worth any price the gambling public may put on them. Today they stand at 3s. per share, let us say. In six months' time the public might think they are worth three times that amount. Johannesburg goes up and down with the share market. Just now it is looking very much down. The amount of business done on the Stock Exchange is small during these dull times.

There is a scarcity of native labor prevailing. Were it not for the Chinese, the industry would be in a very bad way. One or two mines employing Kaffirs have been forced to fill up the gaps in their ranks with coolie labor.

The rains are late this year, and there is a scarcity of water, not only on the mines but in Johannesburg as well. This is a semi-arid place, and there is always distress this time of the year if the rains are late. As the mines expand and the city grows, the question of water supply becomes more and more difficult. Save for a few showers, we have not had rain for nearly six months.

The year 1905 will be remembered for the fires on the mines. Another fine reduction plant has been destroyed by fire, the damage done being estimated at £30,000. The Gensberg mine, where the last fire occurred, produced about 3,300 oz. of gold per month. Fortunately for the company, the mill of the Balmoral mine—its next-door neighbor—is standing idle, and arrangements have been made for the Gensberg to crush its ore with the Balmoral plant. The delay will be for a few weeks only.

The plants of the Rand are generally insured for their full value, but no amount of insurance can make up for the enormous loss caused by the destruction of a plant. The Wolhuter mine, where the plant was destroyed by fire some weeks ago, falls out of the list of producing gold mines. Its monthly contribution of 5,700 oz. will be missed. A new plant will be erected as quickly as possible. At present work is being pushed ahead underground, so as to have big ore reserves when the new mill starts up.

Sydney. Nov. 27.

A venture under the title of the Zinc Corporation, Limited, with a capital of £350,000, has been formed to work the zinc tailing from the Broken Hill field. The company will be under the management of Bewick, Moreing & Co., the directors being W. L. Ballieu, E. S. Hertzig, H. J. Daly, W. Clarke, and H. C. Hoover. No shares have been issued to the public, the scrip being underwritten by the syndicate. The shares are already quoted at 100% premium. The company has purchased some 2,000,000 tons of tailings and secured the output from several mines for a number of years ahead. The value of the metal contents of the tailings purchased is estimated at approximately £25,000,000. It is understood that the company will at present limit operation in Australia to the production of a zinc-concentrate, which will be shipped and smelted in South Wales. The corporation has acquired the right to the use of the Potter acid process at a royalty of 2s. 6d. per ton of concentrate, and it is more than probable that the Carmichael-Bradford desulphurizing process will be utilized for the manufacture of the sulphuric acid required. These operations, taken with the fact that the Broken Hill Proprietary Co. is also actively engaged in the erection of a plant, while the Sulphide Corporation has a zinc distillation plant in operation, point to the development of an industry which must have a widespread influence on the spelter market.

Copper.—Developments at the lower levels of the Mount Lyell mine (Tasmania) are turning out most satisfactory. This company has again experienced a most successful half year, the profits for the term ended September amounting to some £160,000. The production during this period was about 4,250 tons of copper. At the Chillagoe mines, Queensland, the outlook is much brighter. A general improvement is shown both in the quantity and grade of the ore being won, and the revenue derived from the company's railways is well in advance of previous years. As a result of this improved position, the company will now be able to renew the payment of interest on the debenture debt of £500,000.

Tin.—The Mount Bischoff Tin Mining Co. (Tasmania) has declared a further dividend of 7s. 6d. a share, making the total number of dividends paid to date 342, aggregating £2,008,500, or £167 7s. 6d. per share.

General Mining News.

Lake Iron Ore Shipments.—The shipments of iron ore from Lake Superior ports from Dec. 1 up to the final close of navigation were 405,060 tons; an increase of 36,689 tons. The total shipments by water for the full season were as follows, by ports, in long tons:

Port.	1904.	1905.	Changes.
Escanaba	3,644,267	5,307,938	I. 1,663,671
Gladstone	480	.....	D. 480
Marquette	1,907,301	2,977,828	I. 1,070,527
Ashland	2,288,400	3,485,344	I. 1,196,944
Superior	4,169,990	5,118,385	I. 948,395
Duluth	4,649,611	8,807,559	I. 4,157,948
Two Harbors	4,566,542	7,779,850	I. 3,213,308
Total	21,226,591	33,476,904	I. 12,250,313

To this year's figures are to be added the rail shipments, which are not yet reported, but are estimated at 550,000 tons. This will give a total shipment of 34,026,904 tons, which is about 12,300,000 tons greater than 1904, and about 6,000,000 tons more than in 1902, the best year previous to this. The shipments by months during the year have been as follows: April, 1,195,173 tons; May, 4,619,431 tons; June, 4,999,451 tons; July, 5,224,619 tons, August, 5,009,382 tons; September, 4,425,550 tons; October, 4,257,009 tons; November, 3,341,229 tons; December, 405,060 tons. Of the total lake shipments this year, 18,779,374 tons, or 56.1%, were made by the Oliver Iron Co., the mining branch of the United States Steel Corporation.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—The directors report that the production of the mines at Clifton for the month of November was equivalent to 959 short tons of copper. Owing to a very high flood in the river the plant was stopped for several days; production also suffered from short supplies of fuel, owing to the freight cars of the railway companies being all employed in moving the produce of the exceptionally heavy harvest.

CALIFORNIA.

AMADOR COUNTY.

Chase & Boyden are blasting and excavating a place 1½ miles below Jackson for the establishment of a blanket plant to catch the tailings from the mines in that vicinity.

CALAVERAS COUNTY.

Red Gold.—A promising vein has been found in this mine, near Murphy, in the main shaft which is being sunk. It is 3 ft. wide.

Hercules-Horseshoe.—An attachment has been served on this group by Stephen Bros., on assigned claims of $1,100. The property is owned principally by Los Angeles men.

Utica Mining Co.—This company has been compelled to hang up 40 stamps, owing to lack of water, the cold weather in the mountains having frozen up the ditch.

Lightner Mining Co.—The new mill of

this company, replacing the one recently burned, is now boarded in and roofed, very rapid work having been done upon it.

EL DORADO COUNTY.

Golden Hatchet.—This drift claim has been bonded by the North Weber Land & Mining Co., to Thos. G. Patton, who represents Eastern people. The gravel is said to be about 4 ft. in thickness.

INYO COUNTY.

Great Western Ore Purchasing & Reduction Co.—This company, Frank C. Everett, of Reno, Nev., president, is building a smelter at Keeler, to work custom ores and the ores of the old Cerro Gordo property. Grading is done and machinery on the ground. The old 10-stamp mill has been remodeled and is ready to run. The company owns 28 claims in Swansea district, including the Cerro Gordo.

Boland Lockett Group.—Work on this group at Lone Pine is going ahead rapidly, as fast as men and supplies can be procured.

Keynot.—This company at Lone Pine has completed the grading for the new mill. The lower tunnel is being rapidly lengthened.

NEVADA COUNTY.

Oustomah.—The 10-stamp mill to replace the one destroyed by fire a few months since, has been completed. The shaft has been sunk 60 ft. deeper, and as soon as 900 ft. is reached a new level will be opened.

Maryland Consolidated Mining Co.—At this mine, Grass Valley, sinking and cleaning the main shaft is making good progress, but the expense is about $50 per foot, which is much greater than anticipated. When the 1,000 level is reached, the old workings will be abandoned and a new shaft will be sunk as far as the orebodies will warrant. After getting to that level they will be able to reach parts of the Idaho mine, which were not touched in the early day working.

PLACER COUNTY.

Home Ticket.—At this mine, Last Chance, the new buildings are all completed, and the improvements being made are of a substantial nature.

SAN DIEGO COUNTY.

American Girl.—This mine, at Ogilby, has been bonded to W. J. Doran and Franklin H. Griffith, the latter representing Eastern men. The mine was opened some 10 years ago, and was for a time profitable, but has been for the past two years in the hands of Mr. Doran as receiver. The bond states the price to be $165,000.

SHASTA COUNTY.

Balaklala Mining Co.—For this company, at Kennett, heavy supplies of machinery are coming from Idaho. It is stated that the smelter site will be at Squaw Creek, about a mile from the Kennett depot.

TRINITY COUNTY.

Quartz Mills.—There are 17 quartz mills in this county aggregating 168 stamps, as follows: Brown Bear, 20; Chloride-Baily, 30; Fairview, 20; Dorleska, 10; Golden Jubilee, 10; Enterprise, 10; Bullychoop, 30; Mr. Boomer, 5; Oriole, 2; Texas Jack, 2; Bull of the Woods, 2; North Star, 10; Yellowstone, 10; Bartlett, 2; Globe, Golden Chest and Bucks, each five.

SIERRA COUNTY.

Clipper Ship.—This famous old mine at St. Louis is being again worked by E. H. Wimple, under superintendency of Chas. Diersen.

Eureka.—This quartz ledge, on Balsam Flat ridge, has been sold to the Alleghany Mining Co., by A. M. Bixby and others.

Tightner.—The new company is driving the tunnel of the mine at Alleghany ahead, so as to show whether the rich oreshoot continues downward to that level. Another bunch of specimen ore was recently taken out.

Serra Buttes Mining Co.—This property at Sierra City has been temporarily closed down, as the company has been unable to get ore to the mill with the new tramway as at present operated. The old mill on the hill is being overhauled and repaired.

SISKIYOU COUNTY.

Highland.—In this mine, in the Salmon river section, another rich strike has been made, the second in two weeks. The mine is proving itself as rich as any in the northern part of the State, and specimen ore is being taken out at present.

Black Bear Mining Co.—At this mine, Black Bear, Gov. John Daggett, president, the old mill is to be moved up the gulch to the new discoveries.

McFadden & Co.—The mine owned by this firm in Tangle Blue, a tributary of the east fork of the Scott river, is yielding well, and high-grade ore is being shipped to the Selby smelter.

California Consolidated Mining Co.—The following statement is made by the New England Associates, of Boston: "The litigation between the Ball mine and Stephens property, in Eddy gulch, has been settled out of court by the consolidation of the Bell and Stephens mines into one company. These mines have been the leading gold producers of western Siskiyou county for the past 20 years. The vein runs from 3 to 20 ft. wide and the ore averages about $15 per ton gold, with large reserves in sight. These properties are now controlled in Boston, having been acquired by the California Consolidated Mining Co., a sub-corporation of the New England Associates. The 20-stamp mill is being overhauled, and will start within 90 days.."

Golden Rock Ditch.—It is proposed to run water the full length of this ditch this season, which will mean a resumption of work in the mines at Big Oak Flat and Groveland.

Longfellow Mining Co.—Drifting is being done in different directions on the 500 and 600 levels, and the shaft will be enlarged. The 15-stamp mill is kept running.

Dead Horse.—It is reported that San Francisco men will exend the tunnel from the Lady Washington into this mine and cut the vein at 1,500 ft. depth.

COLORADO.

BOULDER COUNTY.

Wellington Association.—President W. W. Degge, of Boulder, Colo., has purchased a tract of timber land for $12,000, and a sawmill is to be erected to handle the lumber for the mines of the company. The company paid an extra dividend Dec. 1, and will pay its regular dividend of 3% December 31.

United Oil Co.—This company, which has drilled several dry wells, five miles north of Boulder, is reported to have struck oil at a depth of 2,000 ft., the quality being the same as found in other wells in that neighborhood.

Inter-Ocean Mining Co.—The last payment of $25,000 has been made by Chicago capitalists, and plans are being made for the erection of a 50-ton cyanide plant at Sunshine. Designs are being made by Floyd Weed, of Denver, a cyanide expert. J. Healy is superintendent.

Black Metal.—This group, near Nederland, has been sold to W. Greenwalt, of Colorado Springs, for $5,000.

CLEAR CREEK COUNTY.

Early Sun Group.—It is reported that this property, in East Argentine district, has been sold for $50,000 to Chicago people, and machinery is to be installed, the operations to be carried on for the present through the Bonham tunnel. B. W. Shepard, Georgetown, is in charge.

Joe Reynolds Mining Co.—This company, at Dumont, has purchased through its representative, Jay Morton, the Natchitoches property on Columbia mountain, formerly owned by the Capitol Mining Co.. It includes lode claims, millsites and the Capitol mill.

Argentine-Central Railroad.—A 50-ton Shay engine has been received for the new railroad from Silver Plume to the property of the Waldorf Mining Co., in Argentine district, and it is expected that rails will be laid by the end of this month.

Empire Smelter Co.—It is reported that the payments have been made on the Golden Eagle and other claims at Empire, and that the Denver and Eastern capitalists will soon begin the work of erecting the proposed pyrite smelter at Empire, using a MacDonald furnace, intending to handle the low-grade ores of that camp. J. C. Chamberlain is president of the company, which is capitalized at $1,000,000.

GILPIN COUNTY.

Eureka.—McGraw & Co. have made a good strike in the 350 west level of this

mine in Eureka gulch, their first carload of smelting ores running $80 per ton. J. C. Jenkins, Central City, is owner.

Clay County.—Gower & Aarons, of London, England, are going to sink a new shaft on this property in Lake district, and to instal a complete plant of machinery. T. Dunstone, Black Hawk, is superintendent.

Gilpin King Gold Mining Co.—Denver and Eastern people have organized this company to operate the Gilpin King group in Lump gulch. Their address is Gilpin, Colo.

Josephine.—This company is developing its group on Tip Top mountain through a tunnel from Little Jenny Lind gulch. The company may erect a milling plant, and may try cyanide, in the spring. W. A. Schorr, Apex, Colo., is manager; Eastern and California capital is interested.

GRAND COUNTY.

Eureka Consolidated Co.—This company, operating on the Rabbit Ear range, 10 miles from Grand Lake, is opening up large bodies it is reported, and will make arrangements for the erection of a cyanide plant to treat the ores during the spring months. Jack Burns, Grand Lake, Colo., is superintendent.

ROUTT COUNTY.

C. R. Hutchinson and Samuel Stevens, of Cripple Creek, have secured a 10 years lease on the Condelin & Blackburn placer ground, consisting of 425 acres, located on Beaver creek, in the Hahn's Peak district. The lessees have interested Eastern capital, and will instal a steam dredge made by the Urie Dredging Co., of Kansas City, with a daily capacity of 1,000 tons.

SAN MIGUEL COUNTY.

Black Bear Mining Co.—Two feet of solid mineral running high in gold, silver and copper has recently been encountered in the lower east drift on this company's group of 14 patented claims, placer and mill site, in Ingram basin, five miles from Telluride. The rich streak has been run through for more than 50 ft. The Black Bear vein is from 7 to 12 ft. wide, and, exclusive of the rich streak, carries an average value of $9 to $12 to the ton. The vein is the extension of the Argentine and Cincinnati, just over the mountain in Savage basin, which has been so profitably worked by the Tomboy Gold Mines Co. for the last four or five years. The Black Bear group embraces 4,000 ft. of this vein. Leonard Kaanta, of Telluride, president of the company, says a representative will leave the first of the year for the East to purchase an air-compressor, machine drills, and an electric hoist which will be installed at the mine in the spring. With this machinery in operation enough shipping ore can be taken out to yield a handsome profit without a mill, which, however, the company is figuring on as soon as possible. The company is capitalized for $750,000, with as many shares of stock of a par value of $1.

Smuggler-Union Mining Co.—As a result of the recent visit of Adjutant-General Bulkeley Wells, of Denver, general manager of this company, the Smuggler-Union 80-stamp mill, at Pandora, is being enlarged by an addition on the west end for the accommodation of more ore-bins for lessees, and nine new frue vanners, the latter handling the product of the Pandora Gold Mining, Milling & Development Co., after it leaves the crushers and amalgamating tables. A portion of this mill will soon be started to pounding on Pandora lease mineral.

Telluride Gold Mines Co.—A representative of this company, Robert H. Wilson, of Chicago, and Calumet, Mich., who was in Telluride recently, let a contract for driving the big tunnel on the Nellie Bly group, located near the top of Silver mountain, between the Suffolk-Globe group at Ophir, and the Gold King mine on the Telluride side, 700 or 800 ft. further to intersect one of the principal veins and to provide an outlet lower down the mountain side than the upper workings through which to work the various claims comprised in the group. The tunnel is already in 200 ft. The Nellie Bly is one of the most promising gold propositions in the district.

Yellow Mountain Mining & Milling Co.—This company is operating the Carribeau-Montezuma group, at Ophir, 16 miles from Telluride. The concentrating plant is treating 35 to 40 tons of ore every 24 hours, which is reduced to concentrates. Heavy development is in progress in the mines, and it is said that after more mineral has been blocked out ahead the milling capacity will be increased. Otto Erickson, of Ophir, is managing the mines and mill.

GEORGIA.

POLK COUNTY.

North Georgia Mining Co.—This company will resume operations at its iron-ore mines, which have been idle for some years. New machinery is being installed, including a washer of from 300 to 400 tons daily capacity, steam shovel, etc. The mine is near Cedartown.

FLORIDA.

GADSDEN COUNTY.

Southern Fuller's Earth Co.—This company, which owns property near Mt. Pleasant, has begun active preparations for mining, drying and grinding fuller's earth for market. About $100,000 will be expended for the construction and equipment of the plant. A. S. White, of Mt. Pleasant, is manager.

ILLINOIS.

Illinois Coal Operators' Association.—At the annual meeting in Springfield last week the following officers were chosen: President, Randolph Smith, of St. Louis; vice-president, R. R. Hammond, Chicago; secretary and treasurer, E. T. Burt, Oglesby, Ill.; commissioner, Herman Justi, Chicago. The following executive board was chosen: First district—H. N. Taylor, S. M. Dalzell and C. L. Sweet. Second district—R. R. Hammond, F. L. Fischer and H. Hartshorn. Third district—D. D. Shumway, Lee Kincaid and T. F. Holmes. Fourth district—F. W. Lukins, Walter Puterbaugh and A. S. Shafer. Fifth district—A. J. Moorshead, E. C. Donk and W. K. Kavanaugh. Sixth district—F. D. Secor, C. C. Davis and W. H. Greenwood. Seventh district—F. S. Peabody, J. D. Peters and Walter Williams. Eighth district—Glenn W. Traer, Richard Newsam and Robert Lee. Ninth district—B. F. Bush, Joseph Lumaghi and J. E. Rutledge.

Resolutions were adopted giving the executive committee authority to represent the association at the joint convention of operators and miners of the central competitive district at Indianapolis in January. The scale committee, the sub-scale committee and floor committee to represent the association at Indianapolis will be named later by President Smith.

BUREAU COUNTY.

Marquette Third Vein Coal Co.—A singular accident occurred at this company's mine, near Spring Valley, on Dec. 24. The shaft-house caught fire and was destroyed, causing a heavy loss on the building and machinery. As work in the mine was stopped for the day there were no miners underground, and there was no loss of human life; but 100 mules stabled in the mine were suffocated by the smoke and the stoppage of air supply. The mine is a large one, having a capacity of 1,000 tons a day, and the estimated loss is $250,000, including the value of the mules.

WILLIAMSON COUNTY.

New Ohio Washed Coal Co.—It is reported that negotiations have been closed for the sale of this company's stock by the Daniels estate to W. S. Bogle and Henry Hafer, of Chicago. The property is at Carterville; it includes a large acreage of coal land, two shafts with a capacity of 1,500 tons of coal a day, and a washing plant which will handle 800 tons a day.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Globe.—Sinking in second shaft being opened on this property by Copper Range Consolidated Co. is down 90 ft. The first shaft was abandoned at 80 ft., owing to its caving in. The new shaft is being sunk as a telescope shaft. The first section is expected to carry down to a point slightly below present depth and the timbering is sufficiently large to permit second section going down inside of it. This will go to 150 ft. and timbering will be large enough to permit third section going down within it. The third section will go down to 200 ft., and from that point interlocked

steel piling will be driven to the ledge, which is believed to be at a depth of 250 ft. A party of experienced miners was secured in the Marquette iron district last week.

Isle Royale.—Sufficient blasting has been done at the new Baltic lode shaft location on section 12 to lead the management to believe that the footway has been uncovered. All preparations for sinking have been completed, and as soon as the dip of the lode has been ascertained the shaft will be started.

King Philip.—Arrangements for development work by this company, organized a few weeks ago, are going forward rapidly. The property comprises all the land lying between the Winona, on the north, and the Penn on the south. This places it where the county line divides it almost equally, one-half being in Ontonagon county and one-half in Houghton county. Openings south from the Winona and diamond drill work on the King Philip itself have proven the lode sufficiently to lead the company to form plans for permanent development, rather than exploratory operations. A shaft will be sunk 1,000 ft. before lateral workings are made to test the lode. All machinery has been arranged for. A compressor, boilers and a 1,500-ft. hoist have been secured. As the overburden is light, the shaft will be bottomed on solid rock without difficulty. Dr. L. L. Hubbard, who is in charge of the St. Mary's Mineral Land Co.'s Challenge mine, will also superintend operations here. Captain John Broan will be in immediate charge.

Trimountain.—Cages for use in handling the men are being installed. They have two decks and two shafts have been equipped, the third nearing completion.

KEWEENAW COUNTY—COPPER.

Diamond-drill work is now being carried forward to establish more firmly the identity of the lode upon which all work has been done and which is pronounced the Kearsarge amygdaloid. The hole recently abandoned was disappointing. It was opened to 500 ft., only 400 ft. of which was in the lode, 100 ft. being in the hanging, owing to the formation rolling. The hole would have been drilled deeper, but conditions prevented. The drill was rigged up at the bottom of the 170-ft. shaft, and the steam made the heat so intense the men could not bear it. Compressed air was then tried, but the exhaust froze up. Fires were built around the drill, but this smoked the men out.

Mohawk.—Operations with the fourth head of stamps at the Traverse Bay mill have begun. This is a steeple-compound Nordberg head and has been in the course of installation during the past summer and fall, completing the Mohawk mill's quota of heads. Adjustments were made in the preliminary run. Production should show an increase of 35%, with the new stamp in commission , but it will take several weeks to adapt the mine to the new conditions.

MONTANA.

TETON COUNTY.

Spokane Petroleum Co.—This company has been organized by D. P. Bowers, president; S. R. Fraser, vice-president; W. R. McCracken, treasurer, and W. L. Jones, secretary; and it plans to develop oil areas in Teton county. H. C. Howell has been made superintendent. The project includes the erection of an oil rig at Lubec siding on the Great Northern railway. No oil has actually been found, but seepages and shales are encouraging.

NEVADA.

STOREY COUNTY—COMSTOCK LODE.

Andes Silver Mining Co.—The special meeting of the stockholders of this company originally called for Dec. 21, for the purpose of voting on a proposition to increase the capital stock from its present amount of $300,000 in 100,000 shares of the par value of $3 each to $2,500,000, in 100,000 shares of $25 par value per share, has been postponed to Jan. 15, next.

Potosi Mining Co.—At the regular annual meeting of the stockholders the old directors and officers were re-elected, with A. F. Coffin as president, and J. M. Purington, secretary.

OREGON.

BAKER COUNTY.

Mayflower. — Considerable excitement prevails in the Cornucopia camps, 60 miles east of Baker City, over a strike just made in the Mayflower mine, in the north workings, of rich gold ore, in a vein 3 ft. wide. Manager Geo. W. Boggs states that the company now has about two years' run of mill ore blocked out. The new mill has been completed, the cyanide plant is about ready to put in operation, and one of the tramways is ready for use. The other one was not quite finished when the snow came. There is now 5 ft. of snow in the camp, and it will be a difficult matter to get the mill started by Jan. 1, as it was hoped to do before delays occurred in the transfers of machinery.

Highland.—The Highland mine, Manager Neil J. Sorensen, now has 20 men at work and three four-horse teams hauling concentrates from the new mill to the shipping station at Haines, for the smelter at Everett, Wash. The miners are now at work in the new orebody in the main tunnel, which is proving of greater value than was expected. Because the mill was running ahead of time, five extra men have just been put to work underground. Forty tons of concentrates are now at Haines awaiting shipment.

Gold Coin.—The Gold Coin mine, in the Burnt River district, 36 miles southeast of Baker City, continues to show rich ore and the owners, Messrs. Ayres & White, of Pendleton, are preparing to open the property on a large scale.

Copperopolis.—Manager M. A. Butler, of this mine in Quartzburg camp, some 60 miles southwest of Baker City, has just returned from New York, where he made all necessary financial arrangements for pushing development work, and erecting machinery. He expects to place a 125-ton plant on the property in the spring.

Valley Queen.—Manager Tom C. Gray, of this mine in Cable Cove camp, 25 miles west of Baker City, reports that during the summer he has done quite a lot of development work, has his camp ready for the winter and will keep his men steadily at work.

Belcher. — Superintendent Daines, of the Belcher and the Golden Gate groups in the Greenhorn camp, 30 miles north of Sumpter, and 40 miles northwest of Baker City, reports that his men are doing steady development work, but the new 20-stamp mill cannot be installed until spring, although it is already at the railroad station near the camp. President Geo. W. Daines is expected back from the East.

PENNSYLVANIA.

ANTHRACITE COAL.

On Dec. 23 the People's Coal Co., of Scranton, distributed $17,000 among its employees as Christmas gifts, the money being given upon the profit-sharing system, and a reward for the faithful manner in which the 700 workers had discharged their duties during the year. This is a unique colliery in more than one respect. It is the only one in the anthracite region where the employees are non-unionists, and, it is the only colliery in the anthracite field where the men work ten instead of nine hours per day, and where grievances and dissatisfaction are unknown. This colliery worked steadily through the last strike when the men, guarded by armed police, earned fabulous wages. After the strike, a mine-workers' local was organized at the colliery, but its career was short despite the strenuous efforts of the leaders to keep it alive. As a token of its appreciation of the manner in which the men stood by their posts, the company, last Christmas, distributed a similar amount. The miners of the colliery earn larger wages than any other coal miners in the world for the reason that they are not restricted to one chamber, as is the general rule in the anthracite region. A miner may have as many chambers as he can demonstrate his competency to work safely and properly. A miner never has to wait for a car. It is the object of the company to permit miners to get all the coal that they possibly can and to earn proportionate wages, as it is of mutual advantage in increasing the output and revenue of the company. One miner earned more than $2,200 this year,

while several have earned more than $1,500. The miners freely expressed themselves as deeply grateful to the company, and as determined to stand by it.

Last week, a splendid wash-house was opened which, according to the mine inspector, is the only one of its kind in the anthracite field. The men change from their street clothes into their mining clothes in the wash-house. In a large, commodious room is arranged a series of shower baths. There are 500 lockers in the wash-house, and each miner and laborer has his own. The wives of the miners are delighted at the trouble saved them in their homes.

BITUMINOUS COAL.

Republic Iron & Steel Co.—This company is doing important work on the coke ovens and other plant on the 1,200 acres of coal owned by it in Redstone and Luzerne townships, near Merrittstown. The work was begun about the first of the year; 100 ovens are completed and much of the other work done. It was proposed to increase the plant to about 400 ovens in the spring, but the contract for the additional ovens has not been let. It is expected to fire these ovens in a few weeks. There is a larry track from the ovens to the tipple, which is not quite ready and the motors for charging the ovens are not in shape for operation, though the power-house is completed. The Fort Pitt Bridge Works, of Canonsburg, have the contract for the tipple and some of the other work at the plant. The best electrical equipment will be used in the operation of the plant and the ovens will be charged automatically. All of the coal will be crushed to make a fine quality of coke. Up to the present time 1,500 ft. of headings have been driven and the air shaft and main hoist have been built, the two openings being connected at the bottom. Among the improvements at the plant which have been completed are the hoisting engine-house, boiler-house, power-house, shops and lamp-house. There is also a large fan-house, which contains a 20-ft. fan, installed and ready for operation. The superintendent at the Republic works is L. S. Walker, while the chief engineer, who has been in charge of the construction work since the beginning, is W. H. E. Royce.

SOUTH DAKOTA.

CUSTER COUNTY.

Placer Locations.—Several hundred owners of ranches in Custer and Pennington counties have organized the Black Hills Homebuilders' Protective Association. A petition has been circulated to be sent to Washington, asking that owners of these ranches may have the privilege of proving up on the ground as placer holdings, or taking the ground under the Homestead rights. A great deal of this ground is within the borders of the forest reserve, which excludes the taking up of the homestead rights. The ground is good only for ranch purposes, with a very few exceptions.

Saginaw.—A station is being cut at the 300-ft. level in a shaft by this company. The big vein of ore recently encountered in the shaft is holding good.

LAWRENCE COUNTY.

Puritan Co.—This company will start up its cyanide plant in about two weeks.

Homestake Extension.—C. E. McHugh, of Deadwood, general manager of this company, states that sufficient money has been raised for the erection of the 100-stamp mill to be built in Deadwood gulch. A new strike of ore has been made in the main vein.

Golden Reward Co.—It is rumored on good authrority that the Golden Reward Co. will blow in the Deadwood smelter during the early part of the year. A number of the company's old mines have been examined by the new manager, Henry H. Schnitzel.

Wasp No. 2.—This company resumed paying dividends this month by the payment of 2c. a share. The ore is running less than $2.50 a ton. A large tonnage and economical handling makes it possible to pay dividends.

Bear Gulch Mining Co.—W. E. Fritz, Deadwood, secretary and treasurer of this company, has gone to Chicago to confer with the directors of the company. About 45 ft. from the surface in the tunnel a shoot of ore has been encountered, carrying gold values.

Branch Mint Co.—The Advance Machine Co., of Deadwood, has received a contract for furnishing the steel, cars and engines for four miles of narrow-gauge track between the mine and mill of this company. The big mill is to be in commission the middle of February.

Reliance Mining Co.—This company will build a 150-ton cyanide plant beginning in April. The proposition submitted to the stockholders to raise $60,000 is meeting with approval.

PENNINGTON COUNTY.

Dakota-Calumet Mining Co.—A new boarding house is being built by this company, 65 by 100 ft. The company is working 20 men, developing the copper vein. This property joins the Blue Lead mine. The shaft on the Blue Lead has reached a depth of 80 ft.

TENNESSEE.

HICKMAN COUNTY.

Messrs. C. W. Weaver and G. H. Elling, of Nashville, Tenn., are completing arrangements for the development of a large phosphate property on the Swan branch of the Nashville, Chattanooga & St. Louis railway. The property is located below Centerville, and is said to contain about 800,000 tons of blue phosphate rock. A company will be organized with a capital stock of $50,000, of which $25,000 will be expended for development work, including the construction of a mill to have a capacity of 100 tons.

UTAH.

JUAB COUNTY.

Yankee Consolidated.—This company has acquired the Daisy mining claim, to settle a suit pending.

SALT LAKE COUNTY.

New Red Wing.—An important strike of copper ore has been made in this property. A 5-ft. vein has been opened; 3 ft. of which show average values, according to a statement from the management, of 12% lead, 60 oz. silver, 0.04 oz. gold, and 23.2% copper. The disclosures were made in the Brink vein.

TOOELE COUNTY.

Honerine.—The Honerine drain tunnel has been completed to a distance of over 9,000 ft. and has cut the Hercules vein, making the seventh cut since the tunnel was started.

WASHINGTON.

OKANOGAN COUNTY.

Bodie Mining Co.—Arrangements are afloat for a reconstruction. Leading shareholders were among the creditors who bought the Bodie mine and mill for $6,000 at sheriff's sale, which amount will be used toward paying off the indebtedness against the company. The principal shareholders of the old company have joined in the move and provided capital to reincorporate and develop the Bodie mine. An order of the court, to turn over the property to the purchasers at sheriff's sale, is expected about Dec. 1. The mine has been opened by tunnels and drifts and winzes on the vein. The ore ran from $5 to $6 a ton. About 1,500 ft. of work in all is reported.

Tungsten Consolidated Mining & Milling Co.—A report has been received from the superintendent, who has sent fresh samples of ore to be assayed. It shows 90 ft. of tunnels; location work for eight claims, each 10-ft. face; three trails to the mine and woods; the building of a log cabin, 40 by 16 ft. over all, and a blacksmith shop and storeroom at the mine. A tunnel has been driven on the lower, or bigger, vein 55 ft., on the Henrietta claim, and shows the vein 6 ft. and 9 in. wide in one place. A tunnel was driven 35 ft. along the foot-wall, on the Marie claim, where a hole was shot into the same vein, which showed 3 ft. of quartz, but not the hanging wall. The quartz from the hole shows a fair distribution of wolframite. This vein has granite for both walls. Four additional clams have been located, which makes 12 in all owned by the company.

Copper World Extension.—The crosscut on the 200-ft. level is in about 50 ft. Indications at the face show that it may run into the vein any day. The company's claims are being surveyed for United States patents.

Palmer Mountain Tunnel & Development Co.—During the week a dam has been built at the headgate of the flume, and a grizzly of heavy timbers has been set in, to prevent logs washing down the creek from doing damage. Occasionally water comes down Toats Coule in great volume and swiftness. Work has begun on the foundation for the penstock.

Grand View.—The last carload of tramway equipment has been received. A capstan has been installed at the top of the hill, to haul up the cables from the mill level. The building of the lower terminal has begun. The bucket cables are respectively 1 and 1⅛ in. diameter and 4,500 ft. long The traction cable, ⅝ in. diameter, is 8,600 ft. long. The cables will be pulled to the summit by the use of a ½-in. cable. No. 3 tunnel is in 340 ft., and the face is now entirely in ore.

Nighthawk.—The upraise from the lower tunnel is up 100 ft. and has about 100 ft. further to raise for connection with the upper tunnel, from which some high-grade ore is to be extracted for testing purposes, previous to further development. The Victoria, Vancouver & Eastern railway will pass the lower tunnel dump within 250 ft.

WEST VIRGINIA.

HANCOCK COUNTY.

Pittsburg & West Virginia Coal Co.—This company, recently incorporated with a capital stock of $1,000,000, controls about 5,000 acres of coal lands, located on the Ohio river, between Chester and New Cumberland, and expects to begin the work of development very soon. Final details as to the capacity and cost of the mining plant, and whether or not the company will construct coke-ovens, has not been determined. Officers and directors are: Ernest W. Marland, president; Ray Wise, vice-president; O. W. Ainslie, secretary and treasurer; Franklin P. Booth, Lawrence Bigum, George W. Eberhart all of Pittsburg; A. S. Cooper, clerk of the court of Hancock county, West Virginia; Alfred Marland, attorney, New Cumberland, W. Va. The main office is in the Farmers' Bank Building, Pittsburg.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA.

Tyee Copper Co.—This company reports that in November its smelters at Duncan's Station, Vancouver island, ran 11 days, and treated 2,051 tons of Tyee ore, giving a return, after deduction of freight and refining charges, of $31,062 in all.

QUEBEC.

Asbestos Mining & Manufacturing Co.—This company, organized at Providence, R. I., will operate an asbestos property at Wolfstown in the Thetford district. The capacity of the plant at the start will be 150 tons of ore per day, but it is the intention to increase this subsequently to 300 tons. The buildings are being erected at the present time, and the plant, which is being furnished throughout by the Jenckes Machine Co., Sherbrooke, Quebec, comprises one 30 by 15 and two 20 by 6 style "B" Farrel-Bacon rock crushers, one set 36 by 17 geared crushing rolls, two heavy pattern cyclone pulverizers, one conveying and picking table 32-in. belt 40-ft. centers, one steel revolving ore dryer 48-in. diameter, 30 ft. long; several revolving sizing screens, together with bucket elevators; all the transmission machinery required, also a pit plant consisting of vertical boilers, derricks, hoisting engine, etc., and a very fine steam plant made up of a 14 and 36 by 26 Jenckes-Corliss engine; two 150-h.p. 72-in. diameter by 18 ft. long, high-pressure tubular boilers, condenser, boiler-feed pump and feed-water heater, all complete.

YUKON TERRITORY.

The Dominion Geological Bureau has issued a special report by R. G. McConnell on the new mining camp at Windy Arm, Tagish lake, in the Yukon territory. He says that the general outlook for the camp is exceedingly promising. Mining conditions are favorable. The Montana vein is so thoroughly impregnated with silver-bearing minerals in places that it is rich enough to ship without much sorting. Most of the veins are situated at distances of from half a mile to four miles from the lake and at elevations of from 1,200 to 3,600 ft above it. Aerial tramways can therefore easily be constructed for the carriage of ores to the lake shore for concentration and can be used to take supplies to the mines. An aerial tramway connects the Montana vein with Conrad City. The Uranus vein is about a mile distant from the Montana. Miners' wages are $3.50 per day.

AFRICA.

NATAL.

Coal production in September is reported at 90,649 long tons, an increase of 24,031 tons over September, 1904. There were 5,251 tons exported during the month, and 42,455 tons sold to steamships in the port of Durban.

RHODESIA.

The Chamber of Mines reports the gold output in November at 32,861 oz. bullion. The total for the 11 months ending Nov. 30 was 370,635 oz. bullion, an increase of 130,997 oz. over last year. The bullion reported this year was equal to 329,865 oz. fine gold, or $6,818,310.

TRANSVAAL.

Transvaal Iron & Steel Co.—This company has been organized, with $250,000 capital, and will build a mill to roll bars, shapes, etc., from scrap. There are large accumulations of scrap iron and steel of all kinds at many of the mills, and the new company has closed contracts with some of the large mines for the purchase of their scrap piles. The mill will be built at Zuurfontein, which is on the railroad between Johannesburg and Pretoria.

ASIA.

INDIA.

A prospector, who has been prospecting in the Himalayas, reports the discovery of gold near Gangutri, and also within the Tibetan boundary. Several copper lodes were discovered, one lode being on the Kulzum Pass, between the Spiti and Lahul. The prospector penetrated over a hundred miles into Tibet, but was prevented from proceeding by the refusal of the natives to supply transport.

EUROPE.

SPAIN.

Imports of fuel into Spain for the 10 months ending Oct. 31, were 1,786,859 tons of coal and 117,316 tons of coke. Exports of minerals for the 10 months are given by the *Revista Minera* as below, in metric tons:

	1904.	1905.	Changes.
Iron ore	6,060,954	6,818,364	I. 757,410
Copper ore.....	888,284	861,994	D. 16,290
Zinc ore.....	115,794	110,972	D. 4,822
Lead ore.....	4,114	5,250	I. 1,136
Pyrites.....	446,130	604,024	I. 157,894
Salt.....	296,842	303,020	I. 6,178

Exports of metals were 36,749 tons pig iron, a decrease of 14,095 tons; 24,871 tons copper, an increase of 499 tons; 1,198 tons spelter, a decrease of 369 tons; 142,972 tons of lead, a decrease of 4,416 tons from last year.

Coal Trade Review.

NEW YORK, Dec. 27.

ANTHRACITE.

The hard-coal market shows a little relaxation in demand, but supplies are coming forward regularly, owing to good traffic weather. Many of the mines have not yet recovered from the holiday, while car shortage is making trouble in some quarters. The fine sizes are the most actively sought, and large tonnages are being taken out of stock to supply urgent orders.

The first outcome of the miners' convention last week is seen in Mr. Mitchell's suggestion to the presidents of the anthracite-producing companies, that they appoint a time for a conference. Besides asking for the eight-hour day, it is understood that the miners urge the creation of a new Conciliation Board which will be in continuous session, and will travel from place to place to settle disputes.

Prices on domestic and small sizes remain firmly fixed at the following quotations: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley f. o. b. New York harbor shipping points.

BITUMINOUS.

Demand in the seaboard bituminous

market continues strong at all points, but the far East and New York harbor show a little relaxation, due to the fact that transportation has expedited the arrival of large supplies at the tide-water points. Prices remain at $2.75@$2.85 f. o. b. New York harbor shipping points. Trade along the Sound is active, and is calling for more coal than is available for delivery. All-rail trade continues active in spite of the tactics of the producers to discourage it. Car supply is limited and varied, but transportation is excellent; any cold weather, however, would immediately reduce shipments and a strong demand would follow.

The vessels in the coastwise market are short of requirements and rates remain firm.

COAL TRAFFIC NOTES.

The Pennsylvania railroad reports coal and coke tonnage originating on all its lines east of Pittsburg and Erie, as follows, in short tons, for the year to Dec. 16:

	1904.	1905.	Changes.
Anthracite.....	4,333,853	4,419,103	I. 85,250
Bituminous.....	26,076,762	29 112,328	I. 3,035,566
Coke.....	8,339,211	10,850,157	I. 2,510,946
Total.....	38,749,826	44.381,588	I. 5,631,762

The total increase was 14.5% this year.

Birmingham. Dec. 26.

There is very little coal being mined in Alabama this week. The convict mines are working on full time, only Christmas day being allowed them. At the commercial coal mines there is very little work to be done, though some of the operators anticipate quite a little output before the end of the year. The general production of coal will begin on Jan. 2. There is a good demand for all the coal that can be mined. The car shortage is being felt quite extensively, especially in Walker county. Locomotive power with the railroads also appears to be rather limited.

Estimates made on the production for the year 1905, now figure around the 13,000,000 tons, against 11,163,573 tons the previous year.

Chicago. Dec. 26.

With the holiday season at hand and mild weather continuing, the coal trade has remained dull. For western bituminous the situation is better than it was a year ago for the corresponding week, owing to the extraordinary weather for December. Stocks of these coals cannot be carried and the fluctuations of supply and demand are necessarily greater than for eastern coals. The market, however, has improved in the latter part of the week and, with the cold wave of Saturday and Sunday to help it, has visibly improved with the first day after Christmas.

The car shortage and congestion of traffic in certain railroads continue to affect bituminous shipments, and anthracite consignments are sure to be generally tied up, if a prolonged cold wave strikes Chicago territory. Bituminous sales are said to be better in the country than in Chicago and prices are firmer. The railroads by their rule shortening free time have diverted considerable coal from the city; wisely, probably, but there is much complaint about the change. Run-of-mine from western mines is in best demand, with domestic sizes generally weak. Illinois and Indiana lump and egg sell for $2.25@$2.80; run-of-mine for $1.85@$2.10, and screenings $1.40@$1.65. Hocking is in good supply and easy, bringing $3.40. Youghiogheny is quoted at $3.25 for three-quarter, and smokeless sells at $3.25@$3.50 for run-of-mine, with the demand for both light.

Anthracite is still in light demand, due to the weather, and chestnut is most in demand.

Cleveland. Dec. 26.

The lake coal trade is more active now than at any time during the active season. Preparations are being made for the coming season's business. It is apparent there will be a good demand in the Northwest. This promises fair prices. At the same time labor troubles are threatened both at the mines and on the lakes. Shippers are also aware that competition will be increased by the opening of new mines, and by the aspirations of new territories, particularly Kentucky and Illinois. The coming season does not promise to be uneventful to say the least.

Current prices on steam coal are still strong. Run-of-mine is governed by competitive buying. Middle district coal is still selling at $1.50 at the mines, with Pennsylvania at $1.30@$1.35 at the mines. The best grades of stock are selling at $1.25 for middle district and $1 for Pennsylvania.

Competition between producers in the Massillon and Coshocton districts are reducing prices on domestic coal. Massillon producers had declared an advance, which is held in abeyance for the time. The quotation still stands, however, of $2.25 at the mines for Massillon selected lump, with the usual difference on Coshocton coal.

Coke is strong, but neither prices nor conditions have changed. The market holds at $4 for spot shipment on 72-hour foundry coke, and $3.90 at the oven on contracts. Furnace coke is holding at $3 @$3.25 at the oven.

Pittsburg. Dec. 26.

Coal.—The mines in the Pittsburg district were in full operation last week and production in the past three weeks has been remarkably good. There has been no complaint of a scarcity of railroad cars since the close of the lake shipping season. Prices remain firm on a basis of $1.30 a ton for run-of-mine at the mine. The rivers were navigable the three last days in the week and nearly 4,000,000 bush. of coal was shipped to the lower markets.

Connellsville Coke.—There was a slight increase in both production and shipments, and both regions are working pretty close to their producing capacity. Standard Connellsville furnace coke sold last week at $2.85, but most of the contracts made for first quarter have been at $3 a ton. Foundry coke is quoted at $3.50 a ton. The production for the week was 283,982 tons, and the shipments aggregated 12,080 cars distributed as follows: To Pittsburg and river points, 4,375 cars; to points west of Pittsburg, 6,446 cars; to points east of Everson, 1,259 cars. The combined shipments from the Connellsville and Masontown fields amounted to 361,516 tons.

San Francisco. Dec. 21.

There is no change to be reported, except a slight improvement in demand for house coal. Steam coal is dull, with fuel oil a hard competitor.

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Dec. 27.

According to the recent report of the directors of the British South Africa Co., the output of coal in southern Rhodesia during the year ending March 31, 1905, was 64,844 tons, as compared with 60,207 tons in the corresponding period ending March 31, 1904. Out of the total produced in the period first named, 51,657 tons were sold, the value being stated at £39,062.

Hull, Blyth & Co., of London and Cardiff, report under date of Dec. 16 that the Welsh coal market is steadier throughout, small coal now being the strongest feature. Prices show little alteration, and the demand for large coal is only moderate. Quotations are: Best Welsh steam coal, $3.30; seconds, $3.18; thirds, $3.06; dry coals, $3.06; best Monmouthshire, $3.06; seconds, $2.94; best small steam coal, $2.34; seconds, $2.22; other sorts, $2.04. These prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

Iron Trade Review.

NEW YORK, Dec. 27.

The holiday season and the close of the year naturally help to bring about a temporary lull in the trade. This is only comparative, however, and does not mean that there is nothing doing. The steel mills are making the holidays as short as possible, in the attempt to catch up on their contracts, and the new business coming in would be considered large for an ordinary period.

A higher range of prices on pig iron seems to have been fixed for at least the first half of next year, probably for the whole of 1906. The United States Steel Corporation, it is reported, will change its policy of buying the outside pig iron it needs, and will contract for six months ahead, instead of making purchases monthly. No change has been made as yet, however, and the Corporation has just arranged for its January requirements.

Plates and structural steel continue to be the forms of finished steel most wanted. Shipbuilders, street-car builders, bridge builders and building contractors are all hunting for material, and are finding trouble in arranging for deliveries as early as they need them.

The scarcity of ferromanganese continues, and in one case as high as $175 per ton was paid for a small lot.

Several of the steel pools have held meetings. Contrary to expectations, present prices were generally re-affirmed. In most cases, however, current business is done at premiums, or advances over the nominal prices.

Birmingham. Dec. 26.

Some selling has been going on in Alabama among the pig-iron manufacturers during the latter part of the month, and the statement is made that several good orders were booked for delivery during the first half of the coming year. Stove foundries purchased quite liberally recently, and more than one company is compelled to accept business carefully for delivery during the first six months of the coming year. The production for the last week of the year will show quite a little reduction, though not as much as was at first feared. The furnaces at Ensley, belonging to the Tennessee Coal, Iron & Railroad Co., have been kept in steady operation through the holiday season so far. Operations at the ore and coal mines will be started again today on a small scale. The steel plant at Ensley will resume operations Wednesday and shut down again Saturday night, to be idle until the following Tuesday. It is given out that as soon as the new year sets in, operations will resume at the rolling mills on a larger scale than for a year past.

The quotations for iron will remain firm, and it is again believed that there may be an advance of 50c. within a fortnight of the opening of the year. The following prices are given: No. 1 foundry, $15; No. 2 foundry, $14.50; No. 3 foundry, $14; No. 4, $13.50; gray forge, $13; No. 1 soft, $15; No. 2 soft, $14.50.

The cast-iron pipe plants will be idle but a few days, the intention being to resume operations as soon as possible after the main holiday.

The "kinship" between the Tennessee Coal, Iron & Railroad Co. and the Republic Iron & Steel Co. will be of considerable benefit to the Birmingham district it is believed. Properties belonging to both companies will be developed on a large scale.

Chicago. Dec. 26.

Notwithstanding the holiday season, the sales of pig iron and iron products in the local market continue good. The trade naturally expects quietness in the latter half of December, with this condition prolonged often into January, but this year promises continued strength. The boom of a few weeks ago has passed, but the demand must necessarily be strong for several weeks to come, as local authorities see the market, in view of the general expansion of business.

Much of the business now is in quick delivery lots, to bridge over requirements of melters until their contracts, placed a month or two ago, become effective. The mildness of the weather makes such purchases more available than they would be under ordinary winter conditions, and more popular. Contract business is not active, but there is undoubtedly a growing disposition of users of iron to make their contracts for second- and third-quarter iron complete, in view of the lack of weakness in the market for these periods and the apparent indifference of the furnace agents to business at close prices. The seller, indeed, would appear to be generally less inclined to extension of sales than the buyer.

Quotations are the same as last week—$14.50@$15 Birmingham, or $18.15@$18.65 Chicago for Southern, and $19@$19.50 for Northern.

Coke is easy, in consequence of large shipments and no greatly increased demand. The price continues $5.90 for the best Connellsville.

Cleveland. Dec. 26.

Iron Ore.—Now that most of the ore sales for 1906 have been made and carrying contracts completed for the transportation of over 10,000,000 tons, vessel interests and shippers are turning their attention to the labor situation. This threatens to be involved during the next few months. Complications have arisen promising to end in a renewal of the strike of masters and pilots of two years ago, and ore-handlers are restless. The latter object to the curtailment of the number of men employed by the introduction of automatic machinery. The result is that it seems, altogether likely that the opening of the season of navigation will be delayed by labor difficulties. A few contracts are still being made for carrying ore on the old basis of 75c. from the head of the lakes; 70c. from Marquette and 60c. from Escanaba. No new ore sales are reported, but prices hold steady at $4.25 for bessemer Old Range, f. o. b. Lake Erie ports; $4 for bessemer Mesabi; $3.70@$3.75 for non-bessemer Old Range and $3.40@$3.50 for non-bessemer Mesabi, all being for base quality.

Pig Iron.—Buying in both foundry and steel-making irons is exceedingly light for the minute. Consumption is heavy and most consumers are disposed to anticipate on orders. But no furnace in this territory has any iron to sell, and the result is that new contracts are few. Those having need for spot iron are forced to go out of the territory to supply their demands. Buying for second-quarter delivery has not started as yet, at least at a lively pace. Prices hold at $18 in the Valleys for all irons.

Finished Material.—Sheets are strong, buying being better than at any time during the year. Prices out of stock are 2.05c. for No. 10 blue annealed; 2.65c. for No. 28 one-pass cold-rolled, and 3.65c. for No. 28 galvanized. One more ship order during the week has increased demand for structural, and virtually assures an active demand from that quarter during the coming year. Plates are strong and the supply is limited. Some Eastern mills have withdrawn from this territory and others are charging premium prices. Building operations by traction lines promise a good call for rails during the coming two months. Billets are almost off the market, one Southern mill selling forging quality here at $35, delivered.

New York. Dec. 27.

The feature of the market has been negotiations for some heavy orders for structural steel, chiefly for bridge work.

Pig Iron.—Foundry iron is quiet over the holidays. There has been some demand for basic and gray forge. Prices are unchanged.

For Northern iron in large lots, we quote No. 1X, $19@19.25; No. 2X, $18.25@$18.75; No. 2 plain, $17.75@$18.25; gray forge, $16.50@$17; Virginia foundry is held at $18.60@$19.10 for No. 1, and $18.10@$18.60 for No. 2. Basic has been $18.25@$18.75 for Alabama, and 25c. less for Northern. For Southern iron, on dock, quotations are: No. 1 foundry, $18.75; No. 2, $18.25; No. 3, $17.50; No. 4, $17; No. 1 soft, $18.75; No. 2 soft, $18.25; gray forge, $16.50. Southern prices are firm, and a little extra is asked for special deliveries, especially on No. 2 soft.

Cast-Iron Pipe.—Prices are steady on a basis of $28.75 per net ton for 6-in. pipe,

carload lots at tidewater points. All the foundries are full of work.

Bars.—Business is good and prices are higher. Iron bars are 1.845@1.895c. for common, and 1.945c. for refined. Still higher prices are expected. Steel bars are 1.745c., tidewater. Store trade is done at about 2.50c. for iron and 2.25c. for steel.

Plates.—Steel plates are still in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. These are the pool prices. Most new orders are placed on a premium basis, the amount depending on the necessities or anxieties of buyers. In the same way, jobbers ask heavy advances on small lots.

Structural Material.—Orders continue to come forward for bridge and building work. Railroad requirements, especially, are large. The mills are overwhelmed with work and deliveries on new orders cannot be promised. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery. These are the pool prices, and buyers have to pay all sorts of premiums, unless they are willing to wait for their material.

Steel Rails.—No change in standard sections. Light rails are in demand, prices ranging from $26 for 35-lb., up to $33 for 12-lb. rails. Girder rails are not in request just now, in this territory.

Old Material.—Demand is only moderate, but prices are firm. No. 1 railroad wrought is $22@$23; No. 1 yard wrought, $21@$22; machinery cast, $14@$15; heavy steel melting scrap, $18@$18.50. These prices are on cars, Jersey City or other terminal delivery.

Pittsburg. Dec. 26.

The iron and steel markets are unusually quiet, but the mills are busy. The suspension for Christmas was only for one day, and all are in operation again to-day. December, which invariably is a dull month, was remarkable this year for the amount of new business booked. It is confidently expected that the United States Steel Corporation will close today or tomorrow for a large tonnage of bessemer pig iron for the first quarter or the first half. There is considerable conjecture as to how the order will be placed, and the general impression seems to be that the Corporation will depart from its policy of buying monthly and place contracts for its requirments for the entire first half. As several of its blast-furnaces are out for repairs it is likely that from 30,000 to 40,000 tons will be required for each month in the first quarter at least. The price it is understood will be $17, Valley furnaces. Some independent steel interests are expected to buy for the first quarter and from present indications the furnaces will be well sold up before the opening of the new year. This will have the effect of stiffening prices and a rate of $18, Valley furnaces, will likely be established after Jan. 1 for bessemer iron. The minimum price this month has been $17.50, Valley. Some small lots sold at a higher figure.

Meetings of the plate and merchant steel bar pools were held during the week and contrary to expectations, ruling prices were re-affirmed. Several opinions have been expressed as to the failure to put up prices. One is that there is no necessity, as the mills are sold up on plates and bars for months ahead, and the custom of asking premiums may be continued. It is hinted that while Congress is in session the steel associations do not care to take action on prices at regular meetings, but that announcement of an advance may be made later. It is understood that prices of wire, wire products, sheets, tin-plate and merchant pipe will be advanced about the first of the year, and an announcement may be made at any time. A. M. Byers & Co., the leading independent pipe interest, last week advanced the price of wrought-iron pipe $2 a ton. The year will close with more orders on the books for finished steel products than in any former year. The United States Steel Corporation reports orders on its books for more than 7,300,000 tons of material, and nearly all of the independent interests are sold up for months ahead. The rail mills likely will be able to fill all orders taken for this year's delivery, and the total tonnage for the year is estimated to be about 2,600,000 tons, and orders for next year already aggregate over 2,000,000 tons.

The announcement on Saturday that President J. A. Topping, of the American Sheet & Tin-Plate Co., had resigned and would be succeeded by Charles W. Bray, the first vice-president, caused some surprise. It is reported that an entire re-organization of the company is contemplated. Mr. Topping declines to discuss his future plans, only to say that he will engage in other business. This statement only, evidently was the basis for a rumor that Mr. Topping is at the head of the syndicate that was formed over a month ago to buy the properties of La Belle Iron Works. When options were taken on the stock of the concern, the Republic Iron & Steel Co., the Jones & Laughlin Steel Co., John W. Gates, A. W. Thompson and other interests were reported to be behind the movement to obtain control of La Belle, but all have denied any connection with the enterprise. Mr. Topping has added his denial to the others. While the year just closed was a record breaker for the tin and sheet interest of the Steel Corporation, both in production and prices, it is hinted that there is dissatisfaction over the low prices that have prevailed. The rate of $3.55 a box for tin-plate and sheets based on 2.40c. for No. 28 gauge announced last December was not enforced, except possibly for some small lots. Instead tin-plate sold as low as $3.20 a box, and sheets were about $4 a ton less than the price fixed in December. An advance was ordered recently and it is believed prices will go higher. The mills are busy; some are idle only on account of inability to get the steel needed. The Carnegie Steel Co., on Jan. 1, will put part of its Ohio works on sheet and tin-plate bars, and it is believed this will enable the American Sheet & Tin-Plate Co. to operate all of its mills to capacity.

Pig Iron.—Sales of bessemer pig iron last week aggregate about about 3,000 tons at prices ranging from $17.50 to $17.75, Valley furnaces. Foundry iron is quiet and the rate of $17.50, Valley, which has ruled for some time, might be shaded on No. 2 grade. Gray forge is quoted at $17.10@$17.35, Pittsburg.

Steel.—The market is quiet and bessemer and open-hearth billets are quoted at $26, but no sales of any consequence have been recorded. Sheet bars are held at $27. No change has been made in plates and bars. Plates are still quoted at 1.60c. and merchant steel bars at 1.50c.

Sheets.—The market is in excellent shape, a great deal of new business having been booked within the past week. Prices likely will be advanced in a short time. Black sheets are still quoted at 2.30c. and galvanized at 3.35c., for No. 28 gauge.

Ferro-manganese.—One carload was sold last week at $175, but there is none to be had for prompt shipment.

Cartagena, Spain. Dec. 9.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 3,200 tons dry ore and two cargoes, 6,300 tons manganiferous ore, all to Great Britain. There is no change in the market, but freight rates are a little easier.

Quotations for iron ores show little change. Ordinary 50% ore is 7s. 8d.@8s.; special low phosphorus, 8s. 2d.@8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrite.—Iron pyrites, 40% iron and 43% sulphur are quoted at 10s. per ton f. o. b. Cartagena.

Heavy Chemicals and Minerals.

NEW YORK, Dec. 27.

The general tone of the market for heavy chemicals is quiet but firm. In most instances the market seems to be a waiting one, delaying action till after the new year; but in spite of the dullness usually associated with the holidays, several staple

chemicals show a decided tendency to advance in price.

Sulphur.—This shows no change from our last report. With prices practically the same, the market shows the usual holiday quiet, though the usual shipments are steadily continued. We give herewith the prices for the American product. Sicilian is quoted the same for Atlantic ports as the Louisiana product.

Pyrite.—This continues unchanged and in steady demand, the production being constantly absorbed (mostly for acid used by the fertilizer makers). Pyrite cannot be used to advantage in making "sulphite pulp" for paper, sulphur being employed for this purpose. Most of the supply, both foreign and domestic, is on long-time contract; but its future is rendered interesting by the development of the new domestic sulphur industry. While this is only a future possibility, yet it may have to be reckoned with.

Nitrate of Soda.—This shows the same prices, with a waiting market which is reported as quiet but strong. Greater activity is expected with the new year.

Salt Cake.—The market is quiet but firm, as also for the *heavy alkalies.* The prices are quoted herewith.

Sulphate of Copper.—This reports another advance, probably in sympathy with the noted advance of the metal, together with an active demand. The price is given herewith.

Tin Crystals.—These are quoted at 21c. —1c. below last month. *Tin bichloride* is reported at 10¼c., a slight advance (¼c.) over last month. The next monthly price can hardly avoid a considerable raise, in view of the high price of the metal.

Phosphates.—Phosphate companies report a decided tendency in the market to stiffen, in view of the advancing prices over the ocean, and the high and advancing freights. There is no accumulation of stock, and there is but little of 1906 delivery yet unsold. The prices for 1907 will not be announced till after the New Year, but the indications are that a decided raise in prices will be announced early in January.

PRICES.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.05
48%	"	.05
60%	"	.11
Muriatic (hydrochloric) 20°		$1.60@1.70
Nitric acid, 36°, 100 lb		4.25@4.75
38°, 100 lb		4.50@5.00
40°, 100 lb		5.75@6.00
42°, 100 lb		5.75@6.25
Oxalic acid, com'l, 100 lb		5.00@5.50
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.10@1.30
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.90
Nitrate of Soda, 100 lb	96%	2.25
" " "	95%	2.22½
Salt cake, 100 lb		.65@.67½
Sodium carbonate, 100 lb., 58%		.98½
Soda crystals, 100 lb		.60
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain. or Europe
Sulphur.		
Louisiana, New York, Boston or Portland	ton	$22.25
Philadelphia or Baltimore	"	22.75
Pyrite.		
Domestic, furnace size	Unit	11c
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines " "	"	9½@10c.
" furnace size	"	11½@12c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

*Fla., hard rock	$7.75@8.00	$10.90@12.10
land pebble	4.00@4.25	7.95@ 8.65
†Tenn., 78@80%	4.60@4.65	.....
78%	4.00@4.25	.....
75%	3.65@3.75	.....
68@72%	3.25@3.50	.....
‡So. Car. land rock	4.00@4.25	.....
river rock	3.75@4.00	.....

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, Dec. 27.

Gold and Silver Exports and Imports.

At all United States Ports in Nov. and Year.

Metal.	November.		Year.	
	1904.	1905.	1904.	1905.
Gold Exp	$30,813,443	$1,187,318	$107,769,000	$44,125,925
Gold Imp	4,727,105	5,171,141	21,667,050	46,514,475
Exc	E. $16 086,338	I. $4,033,823	E. $26,241,950	E. $2,388,540
Silv. Exp	3,405,566	5,631,819	46,020,584	49,316,953
Silv. Imp	2,439,742	4,272,581	23,834,087	30,930,532
Exc	E. $965,844	E. $1,089,238	E. $22,186,497	$18,386,421

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending December 23, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	.....	$46,916	$1,234,311	$46,354
1905	$34 623,733	10,821,686	34,964,216	4,161,314
1904	135,223,869	7,492,337	35,210,621	1,145,490
1903	31,963,109	22,875,077	32,643,456	3,295,200

The gold and silver imported for the week were chiefly in bullion and ore, from Mexico and South America. There were no exports of gold for the week; nearly all the silver went to London.

The statement of the New York banks —including all the banks represented in the Clearing House—for the week ending Dec. 23 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,057,430,200	$1,006,107,100
Deposits	1,094,115,500	985,028,400
Circulation	42,866,900	53,049,700
Specie	210,405,500	176,212,800
Legal tenders	78,370,600	74,203,700
Total reserve	$288,776,100	$250,416,500
Legal requirements	273,528,875	246,257,100
Surplus	$15,247,225	$4,159,400

Changes for the week this year were increases of $1,543,100 in loans, $1,993,700 in specie, $1,139,900 in deposits and $198,325 in surplus reserve; decreases of $1,510,400 in legal tenders, and $11,000 in circulation.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars.

	Gold.	Silver.
New York Associated	$170,212,800	.....
England	149,874,160	.....
France	577,777,665	$217,300,830
Germany	160,940,000	53,645,000
Spain	75,095,000	114,435,000
Netherlands	33,018,500	30,466,000
Belgium	16,133,335	8,166,665
Italy	134,345,000	15,872,500
Russia	576,215,000	18,205,000
Austria	224,440,000	60,545,000

The returns of the Associated Banks of New York are of date Dec. 23, and the others Dec. 22. The foreign bank statements are from the *Commercial and Financial Chronicle,* of New York.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell's as follows, for the year to Dec. 14.

	1904.	1905.	Changes.
India	£9,273,218	£6,584,921	D. £2,688,297
China	455,857	883,590	I. 427,733
Straits	79,268	38,299	D. 40,969
Totals	£9,808,343	£7,506,810	D. £2,301,533

Receipts for the week were £10,000 from the West Indies; £174,000 bar silver and £20,000 in Mexican dollars from New York; a total of £204,000. Exports were £298,500 to India and £4,477 to China; £302,977 in all.

Indian exchange has been strong, owing to heavy exports on the opening of the cotton season. The Council bills offered London brought an average of 16.06d. per rupee. A large quantity of silver is going to India, including some Council purchases for coinage.

The movement of gold and silver at the port of San Francisco for the 11 months ending Nov. 30 was as follows:

Exports:	Gold.	Silver.
Coin	$25,700	$1,960,300
Bullion	1,668,385	5,539,508
Total exports	$1,694,085	$7,499,808
Imports:		
Coin	551,254	468,519
Bullion	1,534,011	2,318,414
Total imports	$2,085,265	$2,386,933
Excess	I. $391,180	E. $5,112,875

Imports of gold were light this year, as very little was received from Australia or Japan. Exports of silver were heavy, owing to the large demand from China.

SILVER AND STERLING EXCHANGE.

Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Dec.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
21	4.86¼	65⅛	30¼	25	.....	...	....
22	4.86¼	65⅛	30⅛	26	4.85⅞	65⅛	....
23	4.86¼	65⅛	30⅛	27	4.85⅞	65⅛	30⅛

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver, .925 fine.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.50	$0.51
Peruvian soles and Chilean pesos	.46	.47
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

December.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
21	18⅛ @18⅞	18¾ @18⅞	79⅛	36¾	5.60	6.60 @6.65	6.45 @6.50
22	18⅛ @18⅞	18⅜ @18⅞	78⅞	36	5.60	6.60 @6.65	6.45 @6.50
23	18⅛ @18⅞	18¾ @18⅞	....	36	5.60	6.55 @6.60	6.40 @6.45
25	.....	.....	.....	.....	.....	.....	.....
26	18⅛ @18⅞	18¾ @18⅞	.....	36	5.60	6.55 @6.60	6.40 @6.45
27	18⅛ @18⅞	18¾ @18⅞	79⅛	36	5.60	6.55 @6.60	6.40 @6.45

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper.—The market has been rather quiet throughout the week, as was to be expected in view of the holiday season. There have been some transactions in small lots for near-by shipment, and a few transactions in futures, but business generally has been dull. Rumors are current of some offerings and re-sales of copper from China. The close is nominal at 18½@18⅞ for lake; 18⅜@18⅞ for electrolytic in ingots, cakes and wirebars; 18⅛@18⅝ for casting copper.

The London market has only three days of business to record, being closed from last Friday over the holidays. The close is steady at £79 6s. 3d. for spot, and £78 15s. for three months.

Refined and manufactured sorts we quote: English tough, £82; best selected, £83; strong sheets, £92; India sheets, £87.

Exports of copper from New York for the week are reported at 2,123 long tons. Our special correspondent reports the exports for the week from Baltimore at 976 long tons of fine copper.

Tin.—There has been a good business doing in this metal from day to day, our prices following closely the fluctuations in the foreign market. The close is somewhat lower at 35⅞@36⅛ cents.

The London price re-acted sharply the latter part of last week. The close is steady at £162 12s. 6d. for spot, and £161 12s. 6d. for three months.

Lead.—The American Smelting & Refining Co. has now fixed its price at 5.60 New York, and 5.52½c. St. Louis. While consumption is still very heavy, new orders have not come in so freely at the higher quotations. For immediate delivery some premium is obtainable.

The London market has shown a great deal of strength, and the close is firm at £17 10s. for Spanish lead and £17 11s. 3d. for English lead.

The American Smelting & Refining Co quotes new prices on near-by shipments from the mines, in lots of 50 tons and over, as follows:

	Desilverized.	Corroding.
St. Louis	5.52½	5.62½
Philadelphia	5.65	5.75
Chicago	5.55	5.65
New York	5.60	5.70
Cincinnati	5.60	5.70
Boston	5.70	5.75
Pittsburg	5.65	5.75
Buffalo	5.65	5.75
Baltimore	5.65	5.75
Syracuse	5.65	5.75
Rochester	5.65	5 75
Utica	5.65	5.75
Providence	5.65	5.75

On carload lots an extra charge of 2½c. per 100 lb. is made.

St. Louis Lead Market. — The John Wahl Commission Co. telegraphs us as follows: Lead is strong and higher. The latest sales are on a basis of 5.85@5.90c. for Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Dec. 9, that silver has been 15 reales per ounce. Exchange is 32.12 pesetas to £1. Local price for pig lead is 86.75 reales per quintal; equal, on current exchange, to £15 2s. 1d. per long ton, f. o. b. Cartagena. Exports were 200 tons desilverized and 514 tons argentiferous to London; 333 tons argentiferous to Marseilles; 25 tons desilverized lead to Genoa.

Spelter.—Reports indicate a rather lifeless market. Offerings have become a little freer, while consumers show no interest in the market whatever for the time being. The quotations at the close are somewhat lower at 6.55@6.60 New York and 6.40@6.45 St. Louis.

The London market is steady at £28 15s. for good ordinaries and £29 for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows; Spelter is quiet, but very strong. The latest sales here are on a basis of about 6.47½@6.50c. The usual holiday dullness prevails, and perhaps we will not see much doing until after New Year's, when higher prices are likely to rule.

Spanish Zinc Ore Market. — Messrs. Barrington & Holt report from Cartagena, Spain, under date of Dec. 9, that prices are nominally unchanged at 95 fr. for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. There has been no change in the local prices, owing to the fall in exchange. Shipments for the week were 433 tons blende to Stettin; 3,600 tons to Antwerp.

Zinc Sheets.—The price of sheet zinc is $7.75 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 and 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, 7.25; August 10, $7.50; December 1, $7.75. The demand is reported active.

Antimony. — European manufacturers have raised their prices materially. Business here is quiet and quotations are unchanged at 13½@15c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York, or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—Prices in New York continue steady at $40 per flask for large orders—over 100 flasks—and $40.50 for jobbers' lots, down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $41.75@$42.25 per flask. San Francisco prices are steady at $39 for domestic orders, and $37.50 for export. The London price is £7 5s., but second hands ask only £7 2s. 6d. per flask.

Manganese Alloys.—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 50 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	480
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted as 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen. These alloys are made by the Isabellenhütte, in Bonn, Germany, which is represented by Mr. Speier in Breslau as selling agent.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

	Per lb.
Aluminum.	
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled sheets	4c. up.
Aluminum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (75%)	12½c.
Ferro-Tungsten (37%)	20c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@98½% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.) (oz.)	40c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Missouri Ore Market.

JOPLIN, Dec. 23.

The highest price paid for zinc ore was $54 per ton, a decline of 50c. The assay basis price was reduced on lower grade ores $1 per ton, placing the range of prices from $45 to $50 per ton of 60% zinc. The average price paid for all grades was $44.58 per ton. Some producers declined to accept the lower offerings, believing there should be no reduction in ore prices with metal growing stronger. As some of the smelters have withdrawn from this field, however, it has been possible to accumulate a reserve stock of close to 4,000 tons, and this, more than anything else, is responsible for the lower offerings. Another important factor is the inability of shippers to secure as many cars as they want for shipping the ore to the smelters. Orders have been issued by the railroads that only outside cars can be used for ore shipments. This order, with a car shortage in connection, deters buyers from purchasing.

No price higher than $78 was paid for lead, but this price was paid for all the better grades, an advance of $1 per ton. Buying was lighter and the word is given out that the top notch has been reached, and that a bear movement in pig lead may cause a reaction in prices soon.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,535,850	283,110	$71,900
Carterville-Webb City	1,291,190	501,550	48,610
Galena-Empire	910,470	148,550	26,280
Badger	743,450	3,720	17,580
Granby	600,000	90,000	14,420
Duenweg	429,140	70,230	12,390
Alba	429,030	10,410	11,120
Aurora	678,250	.....	10,300
Oronogo	338,540	27,890	8,770
Neck City	348,050	.....	8,700
Prosperity	230,910	13,440	5,700
Baxter Springs	132,880	48,950	4,390
Zincite	133,500	5,520	3,540
Spurgeon	129,550	.....	2,590
Central City	80,470	.....	1,810
Sherwood	57,890	3,320	1,450
Carthage	57,060	.....	1,430
Beef Branch	69,760	12,010	1,300
Totals	9,195,190	1,283,700	$252,280
51 weeks	496,370,360	62,125,490	$13,066,250
Zinc value, the week, $205,020; 51 weeks, $11,142,595			
Lead value, the week, 47,260; 51 weeks, 1,923,655			

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
January	33.33	52.00	January	55.55	61.50
February	33.63	52.77	February	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April	35.75	42.88	April	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June	32.93	40.75	June	56.60	57.80
July	33.37	43.00	July	53.00	58.00
August	37.55	48.83	August	53.00	58.00
September	40.18	46.75	September	53.50	63.50
October	43.65	47.60	October	53.50	63.86
November	43.95	49.55	November	54.70	68.67

Wisconsin Ore Market.

PLATTEVILLE, Dec. 23.

The price of zinc was off $1 as compared with 60% ore last week. Several choice lots, however, brought as high as $55, most of the bins being cleaned up in preparation for the annual inventory, as most mills will be closed down the coming week.

Lead prices stiffened up considerably, $34.50 and $35 per 1,000 lb. being the ruling price.

The following camps in the Platteville zinc and lead district report ore loaded as shown:

	Zinc, lb.	Lead, lb.	Sulphur, lb.
Platteville	604,670	.....	.....
Cuba City	66,000	.....	.....
Benton	157,000	.....	.....
Buncombe	342,300	.....	.....
Monfort	.....	.....	105,000
Mineral Point	315,700	.....	.....
Shullsburg	206,650	63,000	.....
Highland	180,270	63,000	.....
Linden	212,490	.....	41,830
Total	2,085,080	123,000	146,830

Mining Stocks.

New York. Dec. 27.

In spite of the holiday week and high rates for call money, speculation was very strong this week. The copper stocks were the center; and rather a wild market developed. The chief speculation was in Anaconda, which was run away up, closing around $62½ per $25 share. The advance was nominally on reports of a large orebody struck in the 2,300 ft. level of the St. Lawrence. No definite statement has been given out, and probably the whole matter will resolve itself into the fact, which has been reported regularly in our Butte letters, that good ore is continuing in the lower levels. Amalgamated Copper, on heavy dealings, not only crossed par again, but reached $107, closing at $106¾.

On the curb, also, coppers were rushed, and high prices touched for several stocks. The market attention was concentrated on this class of shares, in fact. United Copper scored advances, closing at $67, after touching $68; the preferred closed at $88, its highest point. Other high levels were $50¾ for Tennessee Copper; $38 for Utah; $29½ for Boston Copper; $12 for Nevada Consolidated; $10½ for British Columbia Copper.

There was less excitement in the industrials, though United States Steel was active, especially in the common stock, which closed at $40¼, while $105¾ was quoted for the preferred.

On the Consolidated Exchange, the Comstocks were dull. Cripple Creek stocks were hardly touched, but there was some dealing in Tonopahs.

Boston. Dec. 26.

It has again been a market of specialties with North Butte, United Copper, Amalganated, Boston Consolidated and United States Mining in the van. Copper Range and Greene Consolidated have also been conspicuous and more or less active. Outside of these the market has been a sort of desultory one for mining shares. This applies more especially to the Michigan mining stocks, in which there appears to be an almost entire lack of interest, which is marked in view of the strength of the metal market. The curb has shown great activity, but mostly in the new flotations. Utah Apex has been a favorite there, and sold up to $10.25, against a close at $8.37½ a week back. East Butte is the latest to seek honors on the curb, and sold at from $11.50 to $12.25 to-day on extra large trading. Its first appearance was on Saturday at $13, from which it settled to $11. On about 5,000 shares today it rallied to $12.25. North Butte, after settling $6 to $78.50, rallied and touched $90.50 to-day, closing $2 under this. This stock has furnished wider fluctuations than any stock ever traded in this market, and it is generally suspected that it has been fairly well distributed.

United Copper broke over $4 late last week to $56, but touched $68 today. Here again there has been a market with wide fluctuations. Boston Consolidated was more quiet for a spell and settled $2 to $25.12½, but is back again to $20. United States has again become popular, after a long resting spell and is up $5.50 to $46.50. The company is seeking to further broaden its scope. The latest regarding it is that it will invade Mexican territory for a mine and thus increase its smelting capacity. A $1 dividend will soon be declared. Copper Range settled $1.50 to $78.50, but spurted and touched $82.25 to-day. Greene Consolidated is up from $29 to $30.62½.

Amalganated has shown some of its old-time vim, touching $106.50 to-day, which is its highest since the drop from $130 some years ago.

The movement in Anaconda has been phenomenal, rising to $63, a net advance of $16.50 during the week. This was in anticipation of the dividend, which looks as if it might be $3.50 per share a year on the par of $25. A dividend of 87½c. per share was announced to-day. There is a good deal of bull talke on Osceola, but the stock is weak around $105@$106. A $4 dividend declaration is expected shortly. Earnings are said to show about $800,000 the current year. Its copper is costing 9c. per pound, exclusive of construction. Parrot spurted $2 to 34.50 and American zinc $4.50 to $15.50 per share.

Colorado Springs. Dec. 22.

It has been an unusually light week on the Colorado Springs Exchange, with but little demand for Cripple Creek stocks, but prices have remained practically stationary. On the prospect list Anchor was the most attractive stock, and was heavily dealt in the fore part of the week at 3c., but toward the latter part dropped off to 2⅝c. El Paso has been selling for 63@64c.; Elkton at 45@48c., closing today at 45½@46½. Portland sold during the week at $2.10, but on today's market at $2.01. Findley remains quite inactive around 73c.; Isabella is selling at 24c.; Anaconda at 13c.; Independence at 14c.

There is a big deal reported to be on between Milliken, of the Golden Cycle and Carleton, whereby the latter will purchase the former's interest in Independence, and Milliken will secure the Carleton holdings in Golden Cycle. Should this be accomplished much litigation will be ended.

San Francisco. Dec. 21.

The Comstocks were rather dull this week, but fairly firm, except for break in Caledonia, and that was due to unloading by one operator. Ophir sold at $6; Consolidated California & Virginia, $1.30; Gould & Curry, 25c. at the close.

The Tonopahs were quieter than for several weeks past. Montana Tonopah sold at $2.40; Tonopah Belmont, $2.15@$2.20; Red Top, $1.20. There was little change in prices.

Oil stocks are still dull. Claremont brought $1.10 and Oil City 74c. today.

Assessments.

Company.	Delinq.	Sale.	Amt.
Brunswick-Chollar	Dec. 30	Jan. 22	$0.03
Bruswick Con. Va.	Dec. 28	Jan. 18	0.05
Brunswick-T. & Curry.	Jan. 12	Jan. 31	0.03
Brunswick-Potosi	Dec. 13	Jan. 2	0.03
Brunswick-Savage	Dec. 12	Jan. 2	0.03
Bullion	Jan. 11	Feb. 1	0.05
Chollar	Dec. 18	Jan. 8	0.10
Con. New York	Dec. 15	Jan. 2	0.03
Gould & Curry	Dec. 22	Jan. 10	0.10
Julia Con	Jan. 6	Jan. 29	0.03
Little Chief, Utah			0.01
Orient Gold Placer	Dec. 30		0.05
Overman	Jan. 3	Jan. 22	0.10
Segregated Belcher	Dec. 8	Dec. 28	0.05
Silver Shield, Utah	Jan. 13	Jan. 29	0.03

Dividends.

Company.	Payable.	Rate.	Amt.
American Cement Co.	Jan. 10	$0.50	$60,000
Am. Smelting & Ref.	Jan. 15	1.75	875,000
Am. Smelting & Ref., pfd.	Jan. 2	1.75	875,000
Crucible Steel, pfd	Dec. 29	1.00	250,000
Empire Steel & Iron, pfd.	Jan. 1	1.50	37,500
Esperanza	Jan. 2	2.62½	1,181 250
Gen. Chemical, pfd.	Jan. 2	1.50	150,000
Granby Con	Jan. 15	0.30	399,991
Grand Central, Utah	Jan. 1	0.05	12,500
Greene Con. Copper	Dec. 30	0.40	345,600
Guggenheim Exploration	Jan. 2	1.75	183,750
Horn Silver	Dec. 30	0.05	20,000
International Nickel, pfd.	Feb. 1	1.50	133,689
Iron Silver	Jan. 1	0.20	100,000
Maryland Coal Co.	Dec. 30	4.50	84,825
New Idria	Jan. 1	0.20	20,000
Republic Iron and S., pfd.	Jan. 2	3.12½	638,020
Sloss-Sheffield, pfd.	Jan. 2	1.75	117,250
St. Mary's Min. Land	Jan. 1	1.00	150,000
Tenn. Coal, Iron & R. R.	Feb. 1	1.00	225,531
Tenn. Coal, Iron & R.R., pfd.	Feb. 1	2.00	4,966
Teziutlan Copper	Jan. 1	2.25	180,000
Tonopah of Nev.	Jan. 22	0.25	250,000
Uncle Sam Con.	Jan. 1	0.01	5,000
Utah Con., Utah	Jan. 15	2.50	750,000
Virginia-Car. Chem., pfd.	Jan. 15	2.00	360.000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

STOCK QUOTATIONS.

NEW YORK. Week Dec. 27.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	107	97⅛	106¾	671,868
Anaconda	255	183½	250	208,680
British Col. Copper	10⅛	8⅞	10⅛	14,200
Federal	141	132	140	800
Federal, Pf.	108¼	106	107	2,700
Greene Copper	30⅞	29	30⅞	31,000
Greene Gold	4	3¾	3¾	2,600
Mitchell	9¾	9⅛	9¾	2,880
Tennessee Copper	53	48	49¼	10,100
Union Copper	2⅛	1⅛	1⅞	29,050
United Copper,	68	55½	67	144,700
United Copper, Pref.	88¼	84	88	1,300
Utah Apex	10⅛	8⅜	9⅝	37,500

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	168	159	166	147,500
Am. Smelting & Ref., Pf.	132	126½	130	7,350
National Lead	87¾	84¾	86⅝	30,200
Pittsburg Coal	16	15	15	400
Pittsburg Coal, pf.	62	60	60	400
Republic I. & S.	34⅛	32¼	34	13,500
Republic I. & S., Pf.	106⅛	104	105¾	19,300
Tenn. C. & I.	142	133½	133½	12,000
U. S. Red. & Ref.	31	30	30½	1,300
U. S. Red. & Ref., Pf.	60½	67½	67½	700
U. S. Steel	40⅝	37⅛	40⅛	391,710
U. S. Steel, Pf.	106¼	104	105¾	118,060
Standard Oil	702	680¼	700	677
Bethlehem Steel	32	32	32	500

BOSTON.

Allouez	41	36	40¾	2,960
Amalgamated	106½	97⅛	106½	33,070
Atlantic	24	22	24	1,400
Bingham	35¼	34	35¼	1,955
Boston Consolidated	29	25	28¼	25,530
*Jalumet & Hecla	710	700	710	269
†Centennial	29	27½	29	1,880
Mercur	.62	.60	.60	2,380
*Jopper Range	82¼	78	81⅝	20,000
Daly-West	18	17	17⅞	2,447
Franklin	17⅞	15½	17⅞	1,935
Granby	10¾	9¾	10	1,435
Green Con. Copper	31	29	30	16,333
Isle Royale	24	21	23¾	2,682
†Mass	9⅞	9⅛	9¾	520
Michigan	17	15¾	17	3,170
Mohawk	64	60	63¾	1,957
*North Butte	90⅛	78½	88½	19,476
*Old Dominion	34¼	32	33⅞	3,038
Osceola	107	105	106	2,039
*Parrot	34½	31	33¾	6,570
Quincy	108	107	107	75
Rhode Island	5½	5	5½	599
Shannon	7¾	6⅞	7	2,380
Tamarack	120	115	120	233
Tecumseh	11¾	10	11	2,620
United Copper, com.	68	56	67⅞	37,645
U. S. Mining	46½	40⅝	45½	55,099
Utah	54¾	53½	54¼	7,790
Wolverine	133	127	133	202

PHILADELPHIA.

Cambria Steel	29¾	28	29½	18,186
Philadelphia Co.	52¼	51¾	52¼	3,868
Tonopah	16⅞	15¼	16½	7,123

PITTSBURG.

Crucible Steel	13⅞	13¼	13⅞	375
Crucible Steel, Pref.	70	69⅜	69¾	3,101
Tonopah Ext.	5.50	5.30	5.50	2,800

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	46½	46½	44	46⅛
El Paso	63	65½	63	65½
Isabella	24	24	23	24
Portland	200	201	200	200
Vindicator	70	70	70	70

SAN FRANCISCO.

Best & Belcher	1.30	1.30	1.25	1.30
Bullion	.23	.25	.20	.25
Caledonia	.52	.58	.50	.58
Confidence	.84	.86	.84	.85
Con. Cal. & Va.	1.30	1.60	1.30	1.30
Gould & Curry	.23	.23	.23	.23
Hale & Norcross	1.10	1.10	1.00	1.00
Mexican	1.30	1.30	1.30	1.30
Occidental Con	.95	.95	.92	.92
Ophir	5.87½	5.87½	5.87½	5.87½
Savage	.52	.52	.50	.52

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.426	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	62.034	26.760	28.637
November	58.453	63.849	26.952	29.493
December	60.563		27.930	
Year	57.221		26.399	

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.968
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct.	12.993	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	16.599	14.456	16.758	65.085	74.727
Dec.	14.661		14.849		66.384	
Year	12.823		12.990		58.587	

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
March	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct.	28.596	32.481
May	27.718	30.049	Nov.	29.185	33.443
June	26.325	30.329	Dec.	29.286	
			Av., year.	27.986	

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
March	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct.	4.200	4.850
May	4.423	4.500	Nov.	4.200	5.200
June	4.496	4.500	Dec.	4.600	
			Av., year.	4.309	

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	6.087	5.033	5.934	28.225
November	5.513	6.145	5.363	5.984	28.500
December	5.872		5.720		
Year	5.100		4.931		

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality,	sh ton	25.00@35.00
Pumice Stone, Am. Powd.	lb.	.01 3-5@.02
Italian, powdered	"	.01½@.01½
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Chrome Alum	lb.	0.05
ALUMINUM—Sulphate, com'l.	"	75@1.25
AMMONIUM—		
Bromide	lb.	.22
Carbonate	"	.08
Muriate grain	"	.05½@.05¾
Lump	"	.09½
Sulphocyanide com	"	.25
" " chem. pure	"	.35
ARSENIC—White	"	.03½
Red Silesian	"	.07½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03¾
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@98%	"	28.00@29.00
Powdered 80@90%	lb.	.01¾@.02
Chloride com'l	ton.	34.00@36.00
Chem. pure cryst	lb.	.05
Nitrate, powdered, in casks	"	.06
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No 1	sh. ton.	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	20.00
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Arkansas, first grade	lg. "	5 00@5.50
Second grade	"	4.50@4.75
Washed ore	"	6.00@7.00
BLEACHING POWDER—35%,	100 lb.	$1.25@1,30
BONE ASH	lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.35
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHLORINE—Liquid,		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	18.50@19.00
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	7.75@8.00
Am. best ex-dock, N. Y.	"	8.00
English, common	"	12.00
COBALT—Oxide	lb.	2.60
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.52½
CRYOLITE	lb.	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro.	"	.11@.11¼
FELDSPAR—Ground	sh. ton.	9.75@10.00
FIRE BRICK.		
American	per M.	20.00@30.00
Imported	"	30.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill,	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.06
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian pulverized	"	.01@.02
GYPSUM—Ground	sh. ton.	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09½
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
" granular	"	.06½
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	6.50@7.00
Calcined	sh. ton.	16.50@17.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01¾
Sulphate (Glaubers salt)	100 lb.	.40@.50
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Ore	unit.	.18@.20
MARBLE—Flour	sh. ton.	6.00@7.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide	lb.	.10
NICKEL—		
Oxide, crude, 100 lb. (at .55 for fine metal contained		.35@.40
Sulphate, single	100 lb,	.22@.25
" double	"	.13@.15
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06½
English glassmakers'	"	.06½@.06½
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01½
Paris green, pure, bulk	"	.12
Red lead, American	"	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.64
White lead, Am., dry	lb.	.05½@.05½
American, in oil	"	.06½@.06½
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate crystal	lb.	$0 08½
Powdered or granulated	"	.14
Bichromate, Am	"	.08½@.08¾
Scotch	"	.08½@.08½
Bromide	"	.15
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.11
Crystals	"	.10
Granulated	"	.13
Cyanide (98@99%)	"	.18@.19
Kainit (bulk)	lg. ton.	8.50
Manure salt 20%	"	14.75@15.50
Double Manure Salt, 48@53%	100 lb.	1.16½@1.19½
Muriate	"	1.95
Permanganate	lb.	.09½@.10
Prussiate, yellow	"	.13½@.13½
Red	"	.35
Sulphate	100 lb.	2.18½@2.21½
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	4.40
SALTPETER—Crude	100 lb.	4.00@4.25
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.36½
SODIUM—		
Acetate	lb.	0.04¼
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichr mate	lb.	.06½
Bromide	"	.07
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.42
Foreign, f.o.b. N. Y.	"	.75@.77½
Caustic, 60@78%, f.o.b., works	"	.85@.87½
Foreign, f.o.b. N. Y.	"	1.75@1.85
Chlorate, com'l	"	1.90@1.95
Cyanide, ("100% KCN")	"	.11
Hyposulphite, Am	"	.22
German	"	1.50@1.60
Phosphate	lb.	1.75@2.00
Prussiate	"	.02½@.02½
Sal soda, f.o.b. works	100 lb.	.09½@.09½
Foreign, f.o.b. N. Y.	"	.60
Silicate, concentrated	lb.	.85
Com'l	"	.05
Sulphate, com'l	100 lb.	.01
STRONTIUM—Nitrate	lb.	.65
SULPHUR—Best seconds, per ton,		.09
Roll	100 lb.	21.00
Flour	" "	1.85
Flowers, sublimed	" "	1.90
TALC—North Carolina	sh. ton.	2.20
N. Y. Fibrous best	"	15.50@23.50
French, best	"	10.25
Italian, best	"	20.00
		30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.40
TIN—Bi-chloride, 45%	lb.	.09¾
Crystals	"	.22
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½
Chloride, granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CERIUM—Oxalate	oz.	.35
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
TANTALUM—Acid	oz.	.40
Ore, 20% acid	lb.	.20
" 70% "	"	3.50
THORIUM—Nit. 49@50%	"	8.00@10.00
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	10.00

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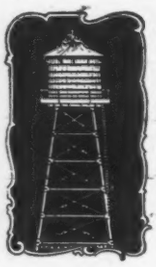

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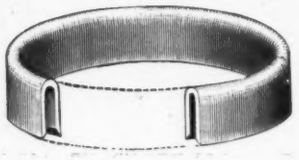

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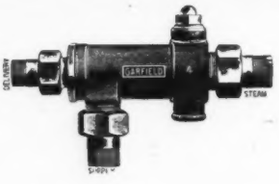

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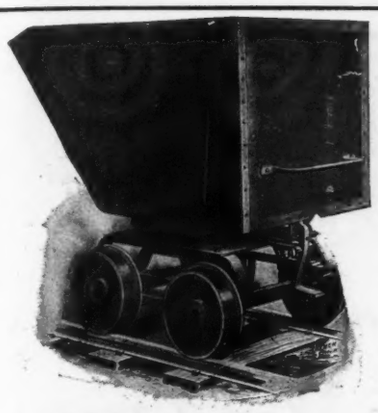

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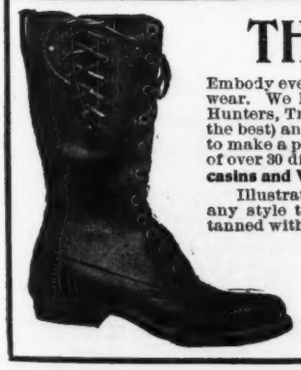

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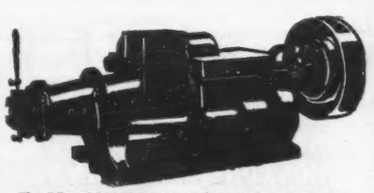

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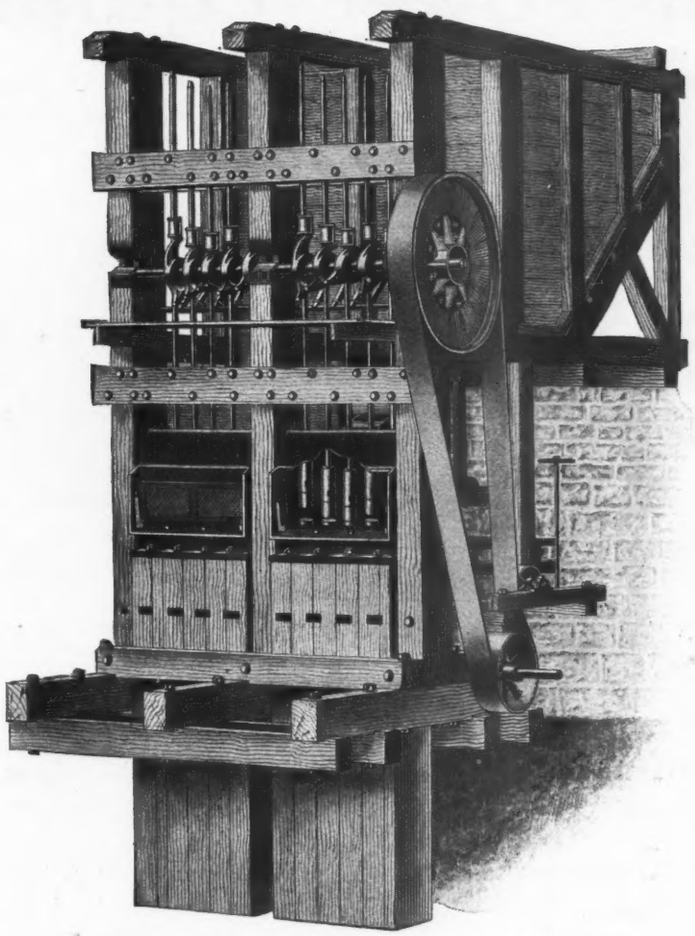

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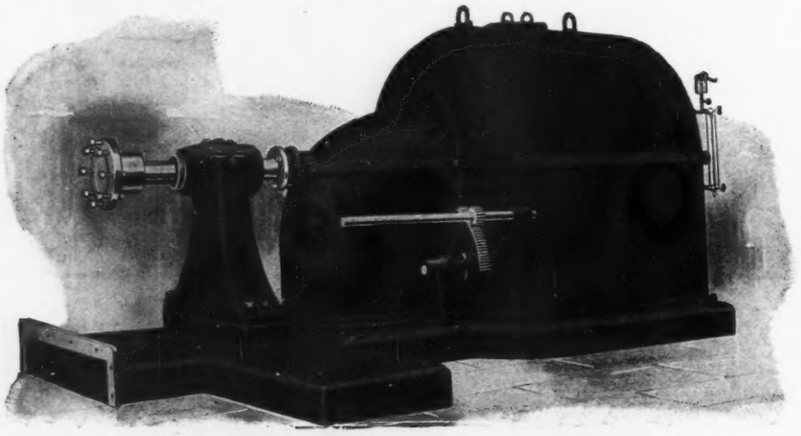

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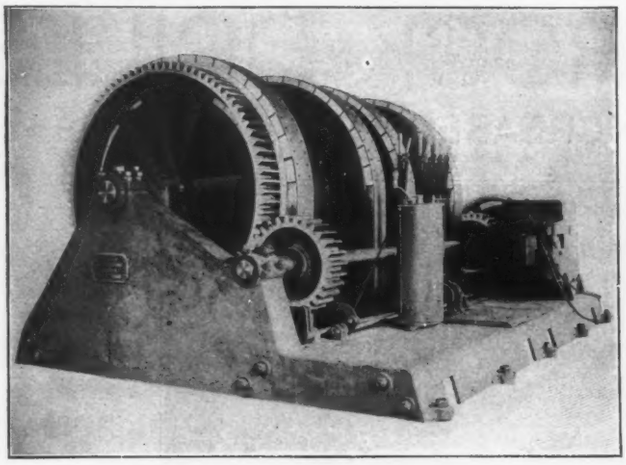

Capacity 6000 lbs. at 800 ft. per min. Each drum holds 6000 ft. 1 in. rope.

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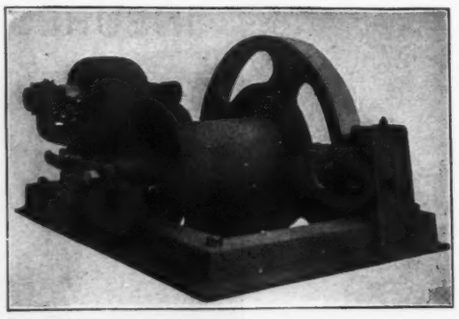

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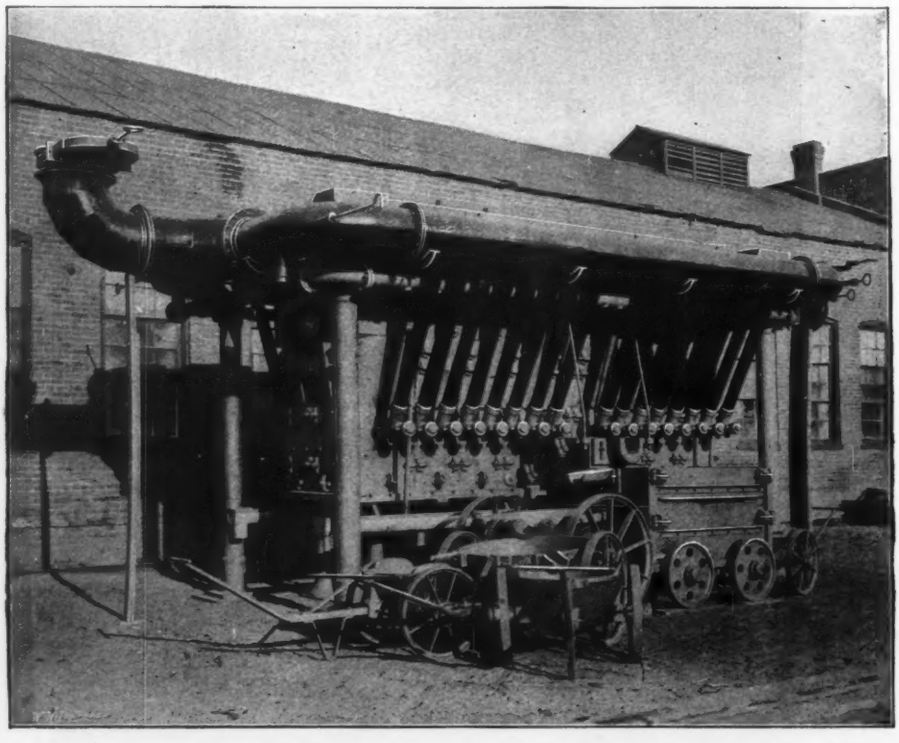

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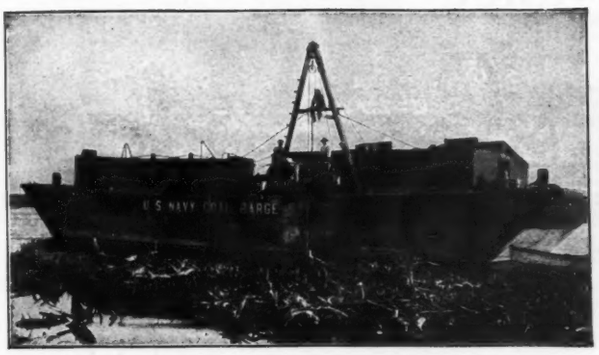

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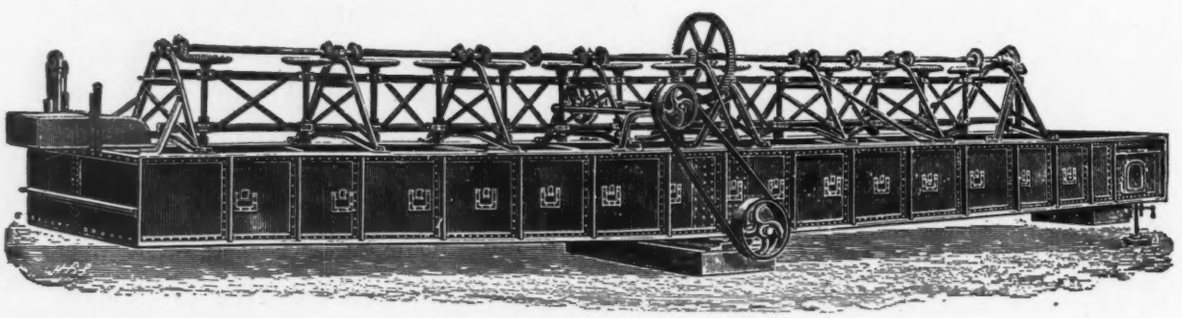

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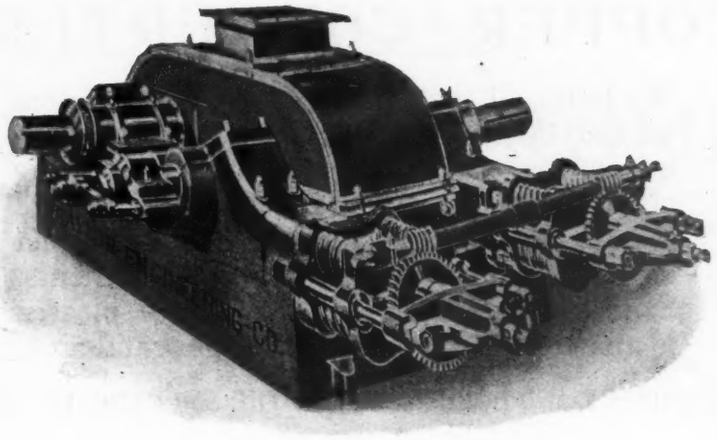

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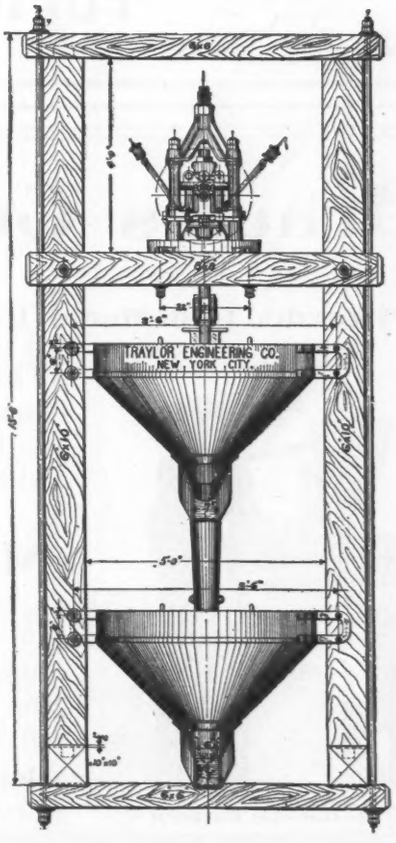

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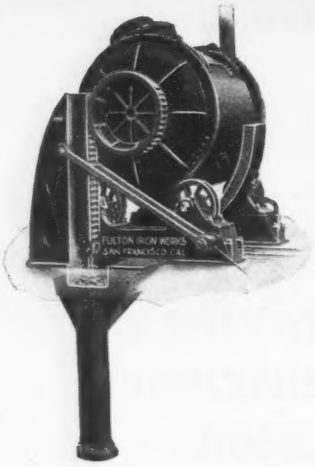

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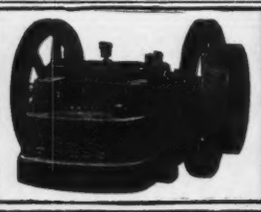

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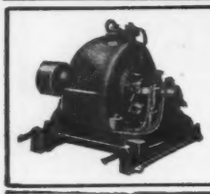

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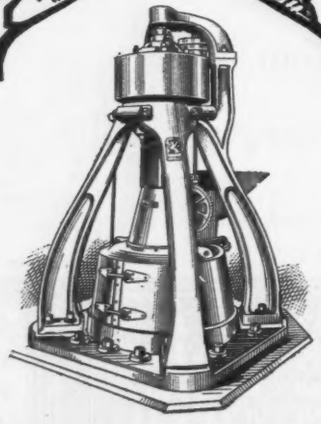

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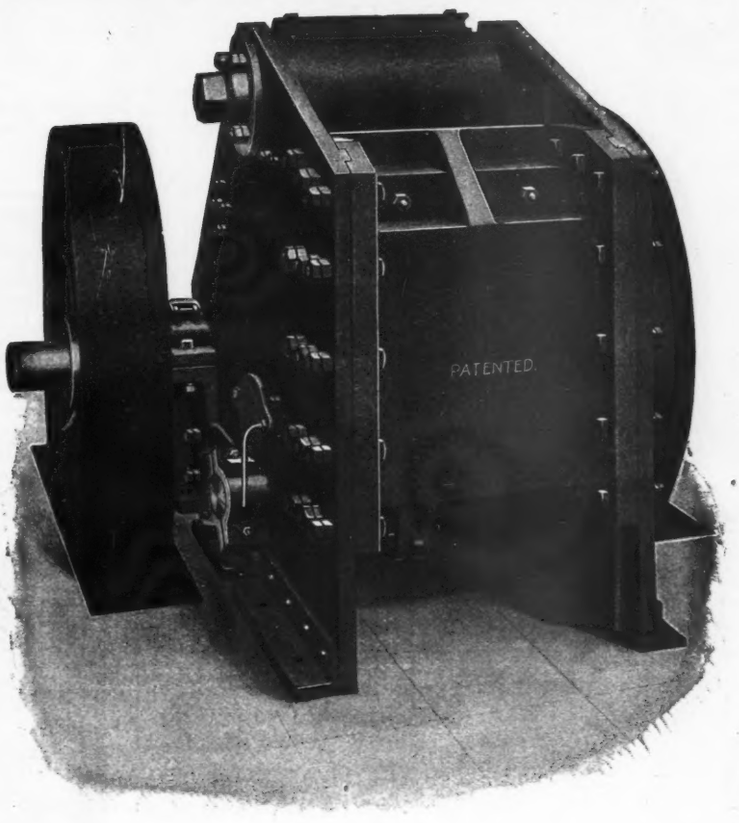

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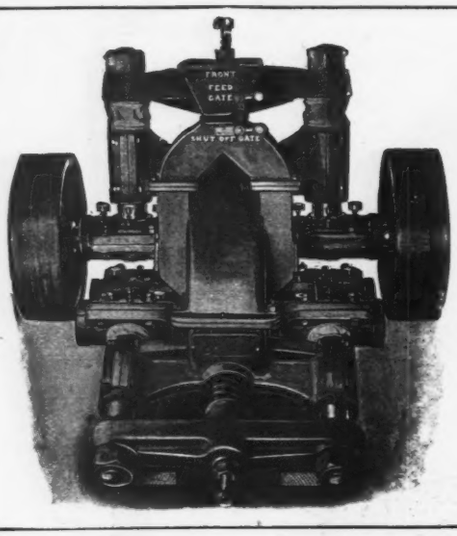

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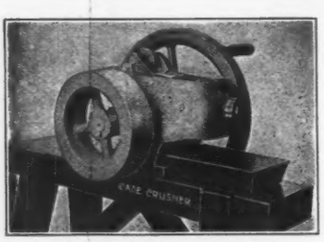

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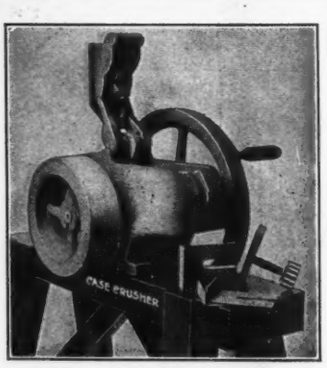

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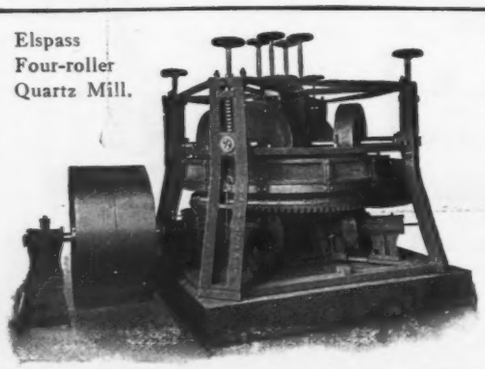

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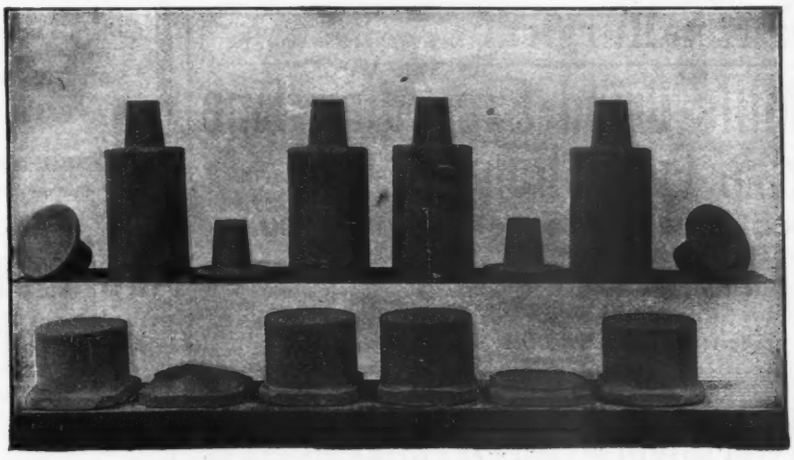

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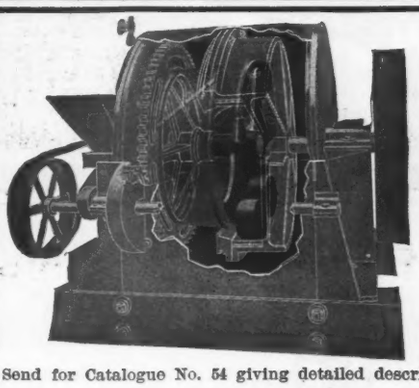

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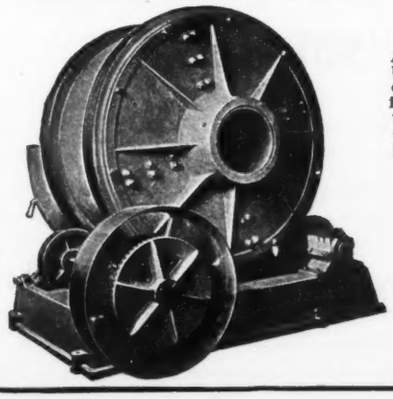

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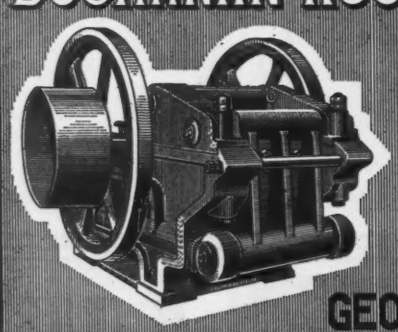

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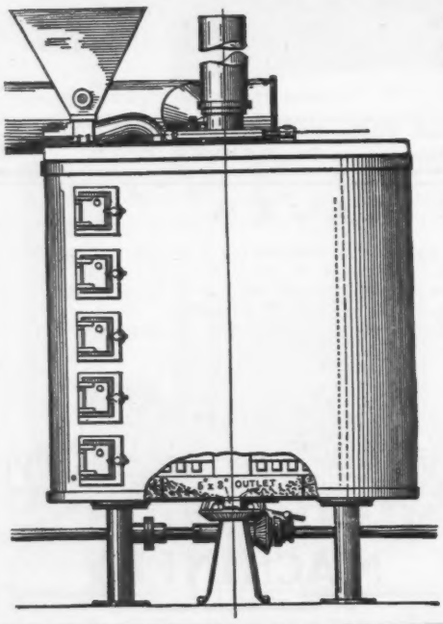

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Repairs and Labor Cost Nominal. One man can attend 100.

NO FUEL USED

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Repairs Can Be Made While Running. No Shutting Down.

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Has greater capacity per horse power, easier adjustments, stronger parts, is of more scientific design, and is the only automatically lubricated crusher on the market.

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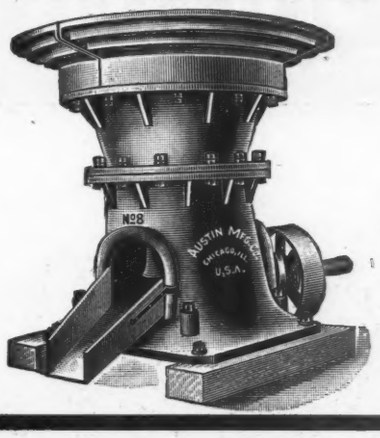

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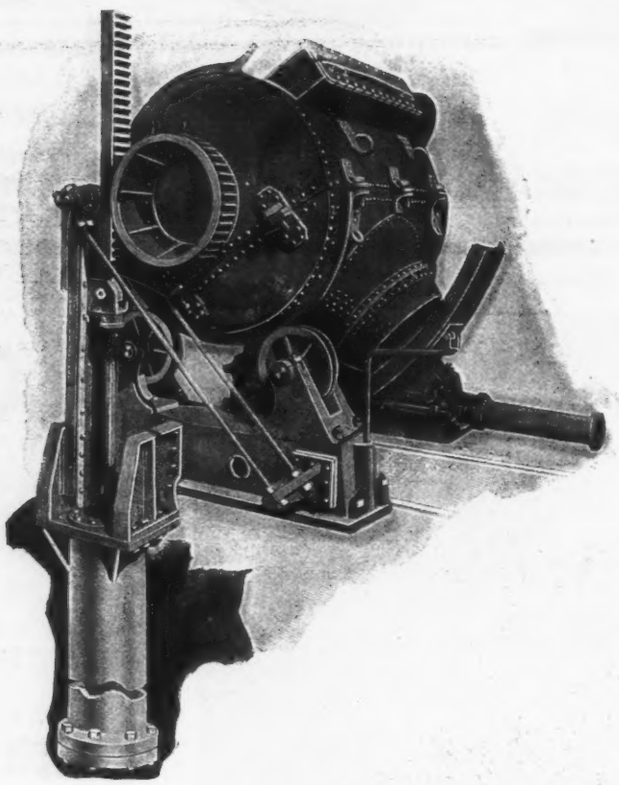

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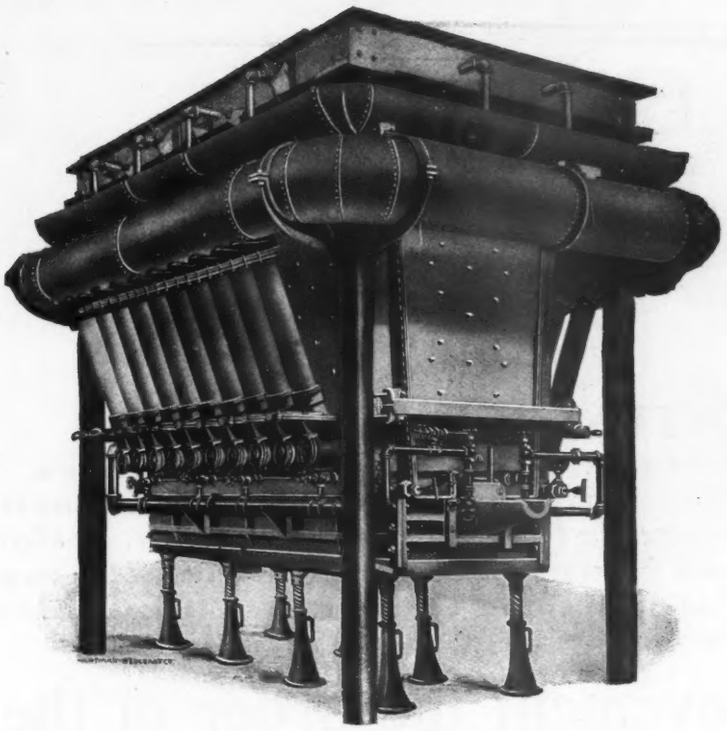

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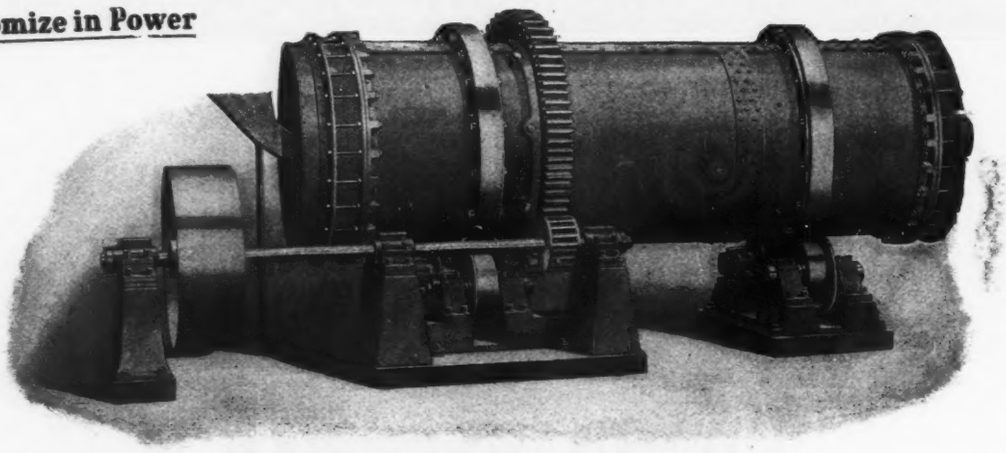

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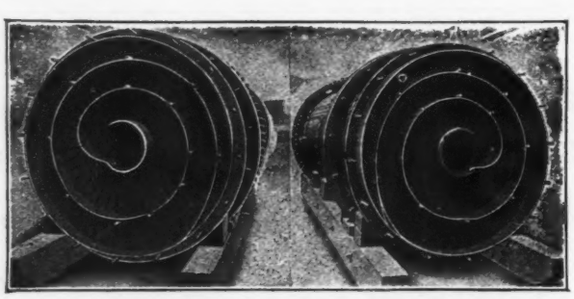

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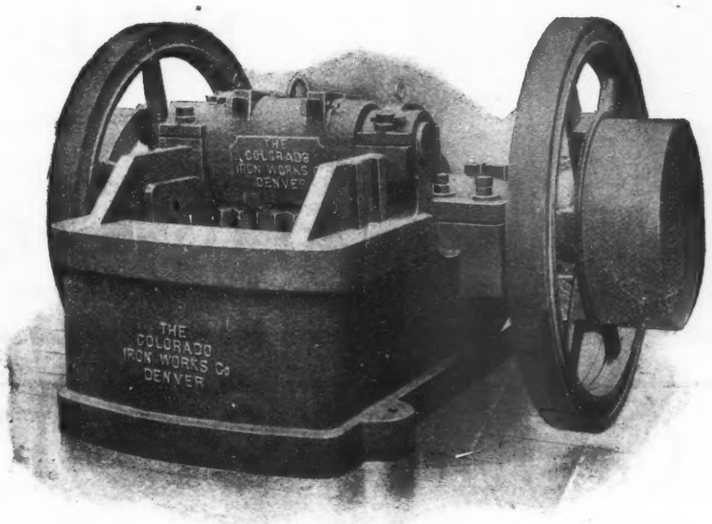

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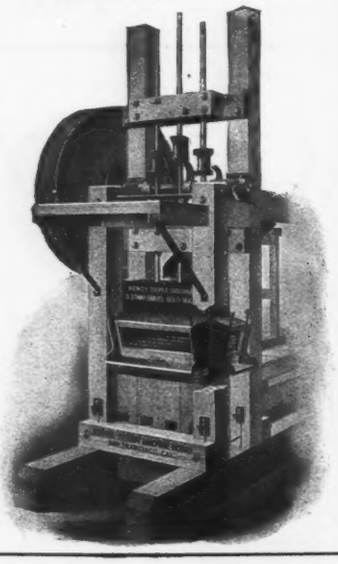

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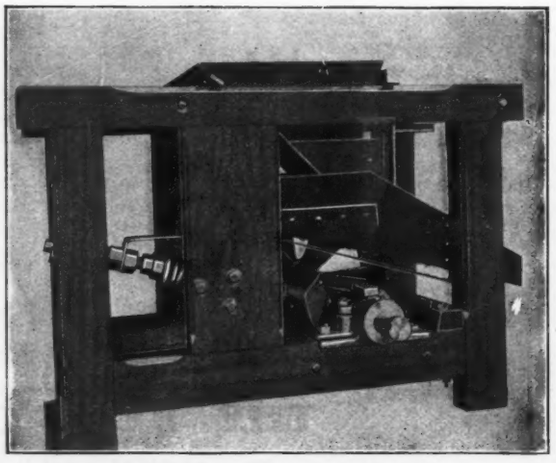

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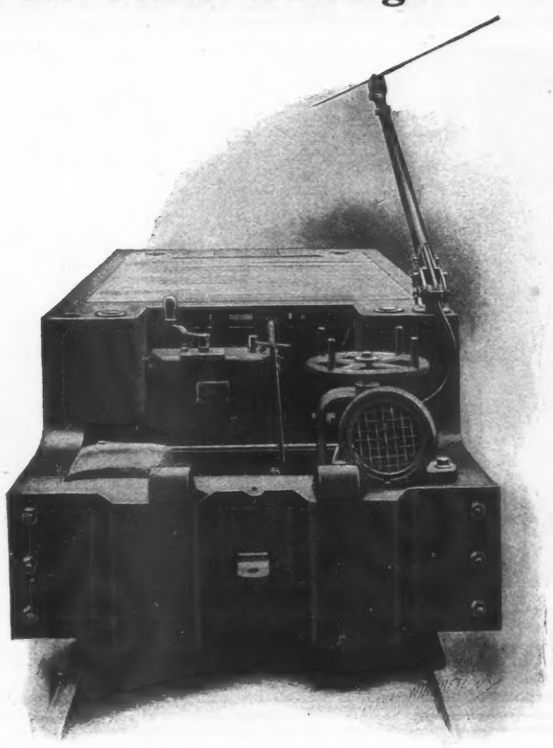

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Address either company for particulars

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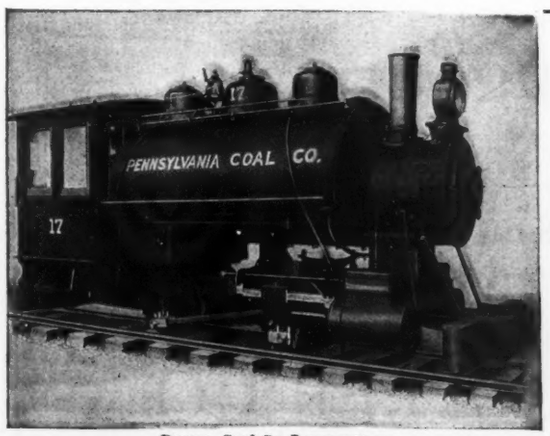

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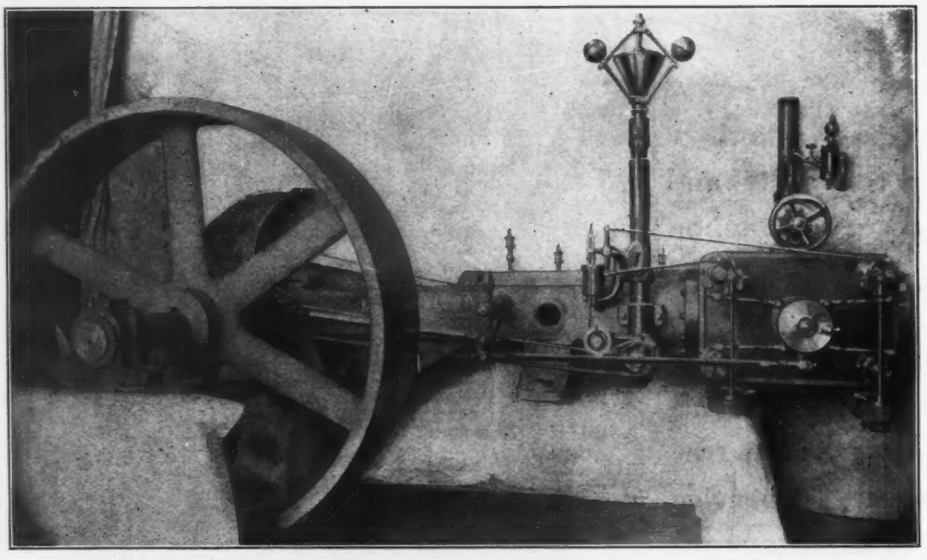

Operating in Rock Houses at a height of 30, 40 or more feet above earth, vibration in an engine is not permissible. The Nordberg is so designed as to run without a tremor. The Nordberg Tandem at the Tamarack is at an elevation of perhaps 70 ft.

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Nickel Steel Rivets

Resist Shearing Stress

NICKEL FOR NICKEL STEEL

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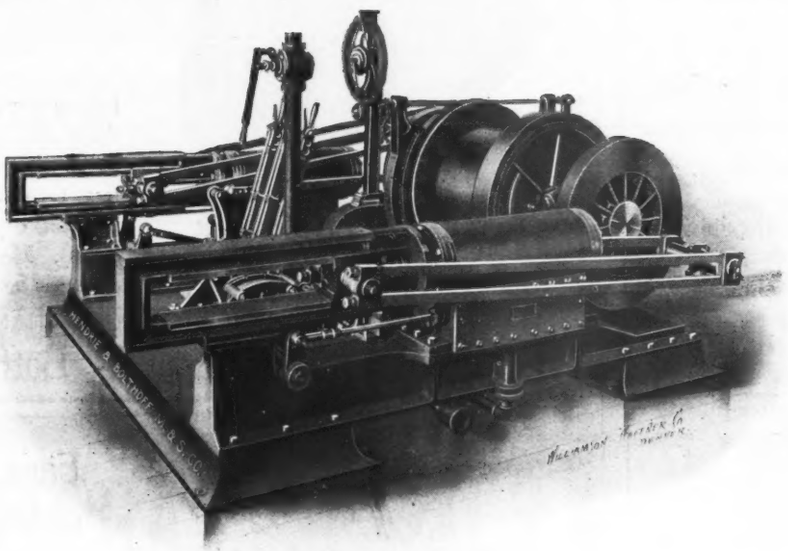

These Hoists are entirely self contained, mounted upon a single bed-plate, requiring but a single foundation of no greater cost than that for a Standard Geared Hoist.

We have, in this Hoist, all the advantages presented by the standard line of Geared Hoists, without any of the noise, vibration, or loss of power by friction of gears.

All of the well-known good points of the standard line of First Motion Hoists have been preserved, including

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Without the great first cost,
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The Danville has repeatedly established its betterness. It holds many hoisting records.

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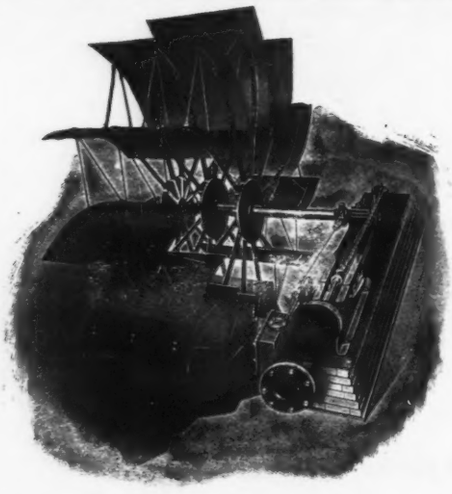

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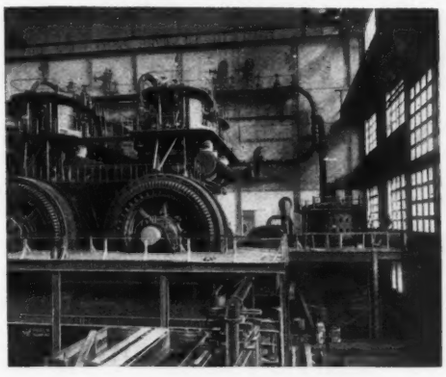

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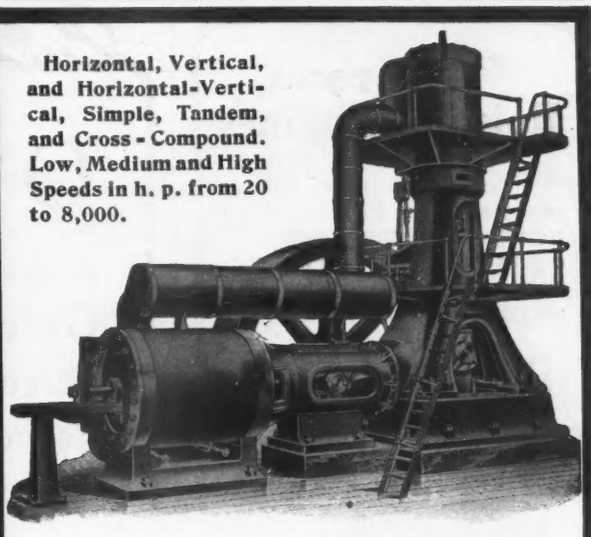

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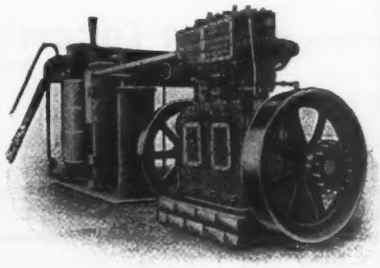

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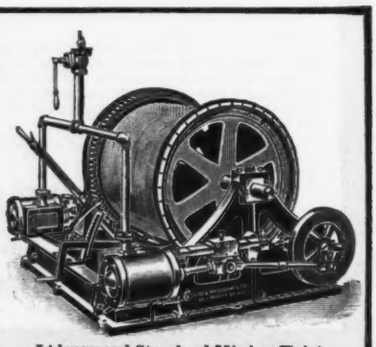

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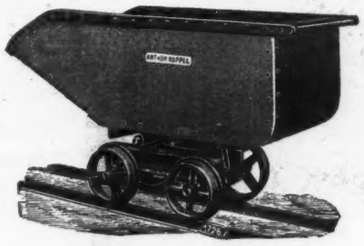

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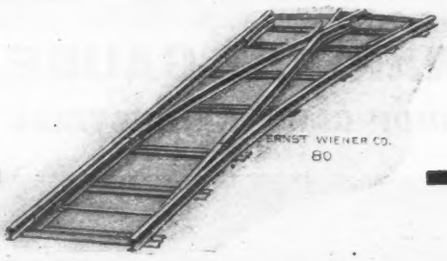

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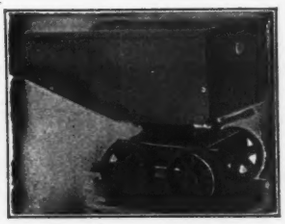

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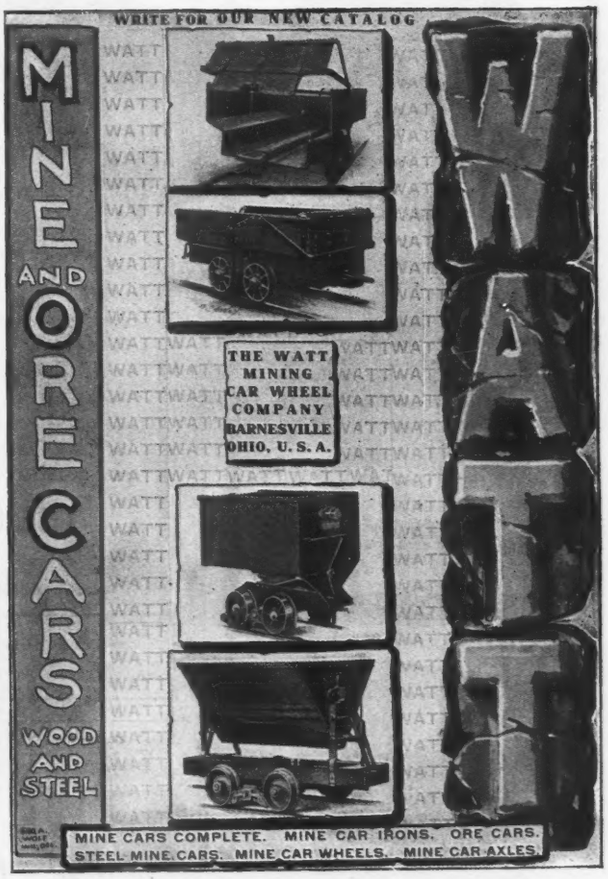
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WOOD AND STEEL
THE WATT MINING CAR WHEEL COMPANY BARNESVILLE OHIO, U. S. A.
WATT
MINE CARS COMPLETE. MINE CAR IRONS. ORE CARS.
STEEL MINE CARS. MINE CAR WHEELS. MINE CAR AXLES.

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NARROW-GAUGE CARS OF ANY DESIGN

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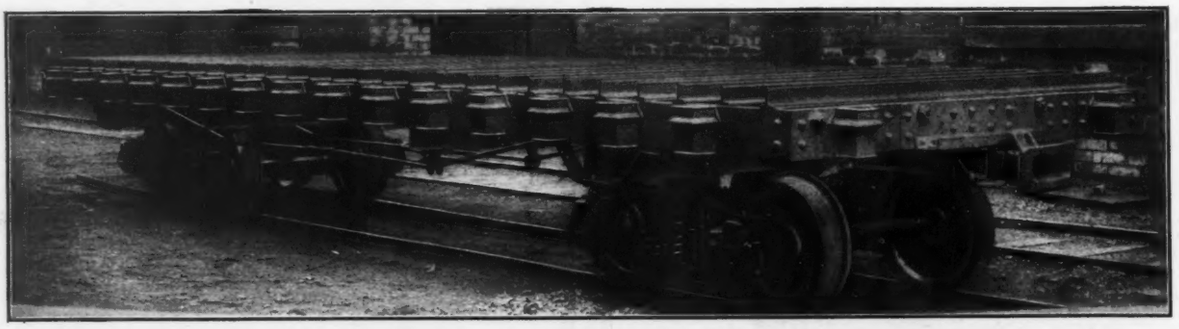
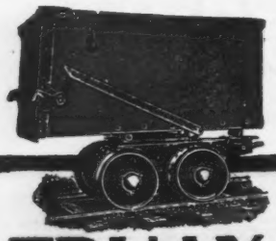


Whenever you want anything in the line of Cars write to

THE KILBOURNE & JACOBS MANUFACTURING CO.

COLUMBUS, OHIO, U. S. A.



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AUTOMATIC ORE CARS

A PROMINENT

Mining Superintendent wrote to us as follows:

"I like Truax Cars because they set low and are easy to shovel into, while at the same time the wheels are fully as large as ordinary cars, that stand from eight to twelve inches higher.

"There is a difference of about three tons of rock per shift in favor of Truax Cars over ordinary cars."

Send for Catalogue No. 9.

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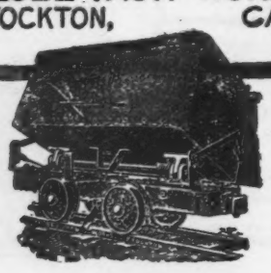
STOCKTON, CAL.



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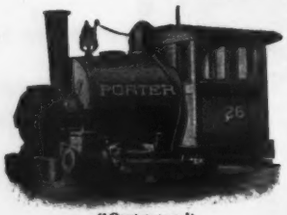

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3 to 50 Tons Weight—Narrow and Wide Gauges

Illustrated Catalogue mailed on application of intending purchaser, or to accommodate others on receipt of 50 cents in stamps.

Locomotives, 36 and 56½-inch gauge, on hand

H. K. Porter Company

555 Wood Street, Pittsburg, Pa.

The Patent Shay
Geared Locomotive
10 to 150 Tons.

Awarded the Gold Medal at the Louisiana Purchase Exposition on account of its superiority over other makes of its type. Built especially for curves and grades too difficult for the ordinary locomotive. Write for catalogue No. 13 mentioning this journal.

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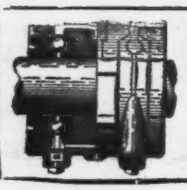
THE LIMA LOCOMOTIVE & MACHINE CO.

121 E. Second St., Lima, Ohio, U. S. A.

A full page advertisement in The Engineering and Mining Journal costs but two-fifths of a cent per copy.



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This box reduces your friction loss to 10% instead of 30% to 40% as in the babbetted boxes. It also saves you 90 % of your oil bills.

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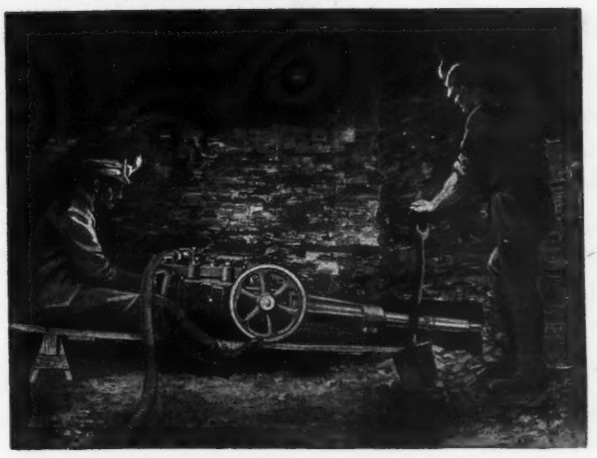

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Marked by: Economy of air, adaptability to either high or low pressure, low cost of repairs, unequalled ease of operation, unprecedented cutting capacity, perfect automatic governing, freedom from shocks and vibrations.

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Adapted to coal of every quality Shears one or both sides of an entry from floor to roof to a depth of 8 feet: Mechanically directed, thus relieving the operator from shock and jar: May be used as a rock drill in shaft sinking, tunneling and extension. Described in Form 353.

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(See also page 61.)

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We are not Dealers or Refiners, but Receive Consignments, Weigh, Sample and Assay them, selling to highest bidders, obtaining advances when desired, and the buyers of two continents pay the highest market price, in New York funds, cash against our certificates.

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100 William Street, NEW YORK
Works: Perth Amboy, N. J.

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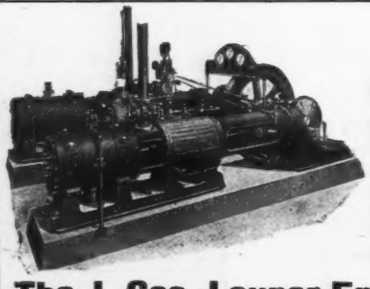
Cyanide, 98/99%
Cyanide of Sodium, 125/130%
and other Chemicals for Mining Purposes.



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Our Air Compressors are designed for Mine Work and other heavy duty So are the Leyner Hoisting Engines

The J. Geo. Leyner Engineering Works Company
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Mining Engineers.

Examine Mining Properties.

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Consignments of Ores, Mattes and Blister Copper solicited

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MANUFACTURERS OF
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See advertisement on page 18.

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CYANIDE 100 to 110%
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Remedying Defects in Processes. Improving and Inventing Processes. Improving Quality and Yield of Products. Testing and Reporting on New Processes. Working Out Manufacturing Formulas. Utilizing Wastes and Unapplied Substances. Reducing Manufacturing Costs. Experimental Tests and Investigations.

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AGENTS FOR
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Copper, Argentiferous and Auriferous Copper, Mattes and Bullion, Lead, Tin, Antimony, Spelter.
See ads., De Lamar Copper Refining Company and La Harpe Smelting Company on page 96.

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SCRANTON FORGING CO.
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MOUNTAIN COPPER CO., LIMITED
Point Lewis Sampling and Reduction Works, near Martinez, Cal.
Buyers of gold, silver and copper ores; copper mattes, concentrates and furnace products.
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Smelters and Refiners of
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European Agents, C. S. HENRY & CO., Ltd. 12 Leadenhall St. London, E. C.

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Dealers in ores and minerals. Purchase and sell ores of all kinds. Advances made on consignments. Rare minerals a specialty. Correspondence Solicited.
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ELECTRODES Pure Graphite Carbons
Long Life—Great Purity—Low Resistance—High Economy
Highly efficient for use in the Electrolytic extraction of Gold from its ores in Cyanide Solutions. No corrosion.
Used extensively in all processes for the manufacture of CHLORINE, BLEACH, and CAUSTIC SODA.
ACHESON GRAPHITE PAINT PIGMENT
A Pure Permanent Protective Coating for Structural Iron and Steel.
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LONDON LIVERPOOL AND SWANSEA
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All Descriptions of
METALS, MATTES, Etc.
Warehouses, Liverpool and Swansea.
Warrants issued under their Special Act of Parliament.
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EMIL BAERWALD,
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Representing
LEWIS LAZARUS & SONS
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Importer of
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COMPLETE PLANT FOR SALE
At Thornton, N. M.

A complete plant of machinery that was in use but nine months for sale at 25 to 50 per cent of its original cost. As good as new for use. Write us for full particulars.

MACHINERY.

2 150 H. P. Heine Water Tube Boilers.
20x42 Reynolds Corliss Engine.
30 H. P. Locomotive Type Boiler.
300 H. P. Feed Water Heater.
100 H. P. Scoville Link Motion Hoist.
12x19x16 Rand Compound Belted Compressor.
16x16¼x16 Ingersoll-Sergeant Compressor.
12 3½-inch Rand Little Giant Drills.
2 sets 14x26 Allis Belted Rolls.
3 sets 14x36 Allis Belted Rolls.
4 sets 16x36 Davis Belted Rolls.
2 9x15 Blake Crushers.
2 5-ft. Huntington Mills.
2 Revolving Ore Dryers.
9 Automatic Ore Feeders.
8 Hexagonal Screens, 3½x8 ft.
4 Gould Triplex Solution Pumps.
12 Steel Tanks, 25 ft. x 6 ft.
12 Steel Tanks, 25x6½ ft.
8 Steel Tanks, 25x30 ft. x 6 ft. 10 in.
5 30-ton Steel Storage Tanks.
5 28-ton Steel Sump Tanks.

BUILDINGS.

Made up of structural steel and corrugated iron.
Compressor and Shaft House.. 68x45 ft.
Crusher Building..... .... 88x75 ft.
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Complete list of machinery and specifications on request.

The S. H. SUPPLY CO.
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BARGAINS IN GOOD 2nd-HAND MACHINERY.

If you are in the market for immediate delivery for any kind of mining machinery or engines and boilers, we have it.

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4—66x18 110 H. P. Horizontal Tubular..... ..... $350.00 each
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4—54x14 60 H. P. Horizontal Tubular..... ..... 175.00 each
4—48x14 45 H. P. Horizontal Tubular..... ..... 150.00 each

CORLISS ENGINES.

1—24x36x48 800 H. P. Allis Cross-Compound..... .....$4,500.00
1—28x48 500 H. P. Allis Corliss... 2,500.00
1—18x42 200 H. P. Bates Corliss.. 1,000.00

STAMPING MILLS AT VERY REASONABLE PRICES.

50 Stamp Mill, 1,050 lbs. each stamp.
40 Stamp Mill, 1,050 lbs. each stamp.
20 Stamp Mill, 1,000 lbs. each stamp.
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15 Stamp Mill, 900 lbs. each stamp.
10 Stamp Mill, 1,000 lbs. each stamp.

Write for Complete Machinery List No. 92.

ALLEN P. ELY & CO., 1110 Douglas St., Omaha, Neb.

SECOND-HAND MOTORS AND DYNAMOS
We carry a stock of 700 Machines. All finished like new and fully guaranteed. Low prices and immediate delivery.
Guarantee Electric Co., Chicago

RAILS
40, 56, 60, 70, 75, 80, 85 and 90 lbs.
RELAYING RAILS
8, 12, 16, 20, 25, 30, 35, 40 and 45 lbs.
NEW STEEL RAILS

These rails are in stock at our Pittsburgh yards, and can be shipped immediately; also second-hand rails in stock cut any length needed for building and contract work.

RICHARDSON & COMPANY, Inc.,
1215 Westinghouse Building,
PITTSBURGH, PA.
RAIL DEALERS.

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We have on hand three Jackling Straight Line Furnaces. For immediate delivery, will sell cheap f. o. b. cars. Used only sixty days.

BRADLEY ENGINEERING AND MACHINERY COMPANY
Spokane, Wash.

FOR SALE. First-class 30-lb., 35-lb., 40-lb., 56-lb., 60-lb.
Re-laying Steel Tee Rails
and Angle Splice Bars for same. Also other weights of re-laying rails and *New Light-Weight Rails* of any weight. Prompt shipments made.
Robinson & Orr, 419 Wood St. Pittsburgh, Pa.
☞ *We make low Prices on Switches and Frogs.*

RAILS FOR SALE.
QUICK SHIPMENTS FROM STOCK
30-, 35-, 40-, 52-, 56-, and 60-lbs.
RELAYING RAILS
12-, 16-, 20-, 25-, 30-, 35-, 40-, 65-, 80-, 90-, and 100-lbs.
NEW STEEL RAILS
All these rails are ready for shipment as soon as cars can be placed, and we can quote low prices.
Please write, or wire us for quotations.
We also buy new and relaying rails of all sizes.
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Wm. Hasenzahl,
Manufacturer of Diamond Bit, Rock Drills, Core Drilling by Contract.
Special Tools for Coring Coal.
315 E. Second St., - CINCINNATI, OHIO

THE WESTERN MACHINERY
SECOND-HAND MACHINERY

A COMPLETE stock of Machinery used in the Mine, Mill and Smelter.

Write for our list.

The Great Western Mach'y Co.
1624-38 Blake Street
DENVER, COLO.

FOR SALE

A Pennsylvania Diamond Drill Company's No. 4 Prospecting Drill with Hydraulic Feed. Capacity 3,000 feet for a 2-in. hole. (If desired it may be fitted to bore larger holes to less depth.) Complete with 934 feet Drill Rods, Core Barrels, two Bits set with Carbons, Boiler, Steam Pump and all other appliances and tools ready to go to work. Practically as good as new. Cost **$4,000**; first check for **$1,500** takes it.

CHARLES B. SHARKEY, Hazleton, Pa.

Water Works Contract

Bids will be received by H. L. J. Barnes, Clerk City of Macon, Miss., until 6 P. M., Tuesday, January 9th, 1906, for furnishing all material and erecting a tank and tower, a filter plant, a clear water basin and a raw water basin, as per plans and specifications on file.

J. O. FASER, Mayor,
H. L. J. BARNES, Clerk,
WM. F. WILCOX, Engineer,
Jackson, Miss.

1—6

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The Engineering and Mining Journal

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1 Laidlaw-Dunn-Gordon Co.'s 24x15x18 Single-Cylinder Two-Stage Power Air Compressor, No. 16824; direct motor driven; capacity 1,000 ft. air.

1 Franklin (N. Y.) Air Compressor Co.'s 18x11x14 C. B. Compressor; belt driven; capacity 500 ft. air.

1 Rand Drill Co.'s 17x10x16 Compound Class "D2" Compressor; belt driven; capacity 500 ft. air.

1 Pedrick & Ayer No. 2 Comp. Auto. Belt Air Compressor; capacity 100 ft. air.

Cableways

1 Electrically operated Lidgerwood Mfg. Co.'s Cableway, span 360 ft.

1 Electrically operated Lidgerwood Mfg. Co.'s Cableway, span 1,300 ft.

Write for particulars.

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Chloride of Lime, Zinc, Dust, Cyanide of Potash, Hyposulphite of Soda.

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Gold	$.75	Gold and Silver	$1.00
Lead	.75	Gold, Silver, Copper	1.50

Samples by Mail receive prompt attention.
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Dealer in
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Weighing, Sampling and Assaying attended to for sellers.
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Material and Supplies from the Fifty Million Dollar St. Louis World's Fair.

We offer you a rare opportunity to buy general Structural Material, Machinery, Electrical Apparatus and Supplies of every kind at prices easily 30 to 50% below what they would ordinarily cost you. We are now engaged in dismantling the Exposition, and can make delivery of most of this material from St. Louis, although a large proportion of it has been transported to our main headquarters at West 35th and Iron streets, in Chicago. We can make you extremely low prices on anything in the line of Lumber, Studding, Joists and Timbers; Matched 2" Planking, Dressed and Matched Flooring. We can furnish you Timbers in sizes 4x4, 4x6, 6x6, 6x8, 8x8, 10x10, 10x12, 12x12, 14x14, and in lengths from 8 to 80 feet. Also Interior Finishing Material.

We have thousands of heavy Wooden Trusses, just the thing in the construction of Factories, Shops and the like. We can furnish lengths ranging from 48' to 106' span. We can furnish you blueprint and sketch, with full details.

We have thousands of Doors for every purpose. Some of these are glazed and some are plain.

We also call your attention briefly to other items, which we think you will find of considerable importance to you.

MACHINERY FOR IMMEDIATE DELIVERY.

We have some special offers of interest in particular to Mining Propositions. All of this Machinery we can deliver at once, and if orders are received before stocktaking, we will sell at sacrifice prices in order to make room for new stocks coming in.

2 250 H. P. "Heine" Water-Tube Boilers, used for operation at the St. Louis World's Fair.

2 complete Electrical Plants, consisting of 1 9x10 horizontal center-crank heavy-duty "Ball" Engine; 1 11x12 Self-Oiling Greene Engine; 2 30 K. W. 250-volt, direct-current, multi-polar Generators, with Switchboard, Feed Pump and Heater, also Driving Belt. Will sell complete or separate. Just the thing for small isolated light plants.

1 800 H. P. Reynolds Corliss Engine, complete and in fine condition, thoroughly overhauled, and can make quick delivery. Special bargain for someone.

1 18x42 heavy-duty Allis-Chalmers Corliss Engine, and 1 16x42 Hooper Corliss Engine; both in first-class condition and ready for immediate shipment.

1 Bullock "Champion" Diamond Prospecting Core Drill, complete, with 1,500 feet of Rods, Boiler, Pump and all equipment. Will rent or sell.

We also have 12 very fine Carbons for sale.

1 6'x10' face and 1 6'x5' face Webster, Camp & Lane Drum on one shaft.

1 150 H. P. "Heine" Water-Tube Boiler.

1 complete Crusher Plant, consisting of 250 H. P. Corliss Engine, No. 8 Gates Rotary Crusher, with complete equipment, consisting of Elevator, Screens, Car Rails, Belting, etc.; the entire equipment complete, or we will sell separate.

3 Electrical Mine Equipments, consisting of 2 16x16 center-crank Ball engine, 2 100 K. W. Morgan and Gardner Generators, with Switchboard, Driving Belt, etc.

1 16x16 Automatic Skinner Engine, with 100 K. W. Commercial Generator, 250 volt, complete with Switchboard and Belt.

10 Crawford and McCrimmins 10' and 12' Fans, with Engine connected.

3 100 K. W. Maloney Type "A" Transformers, 6,600 to 220.

2 16x16 "Hendey" Center-Crank Engines.

1 14½x14 Arlington & Sims Engine.

2 18x30x16 Westinghouse Comp. Engines.

1 Horizontal Cross-Compound Arlington & Sims Engine, 13½x20¼x15.

1 24x36x8 Worthington Compound Duplex Mine Pump.

A battery, consisting of 4 60x16 Horizontal Boilers, double-riveted throughout, complete with fronts, trimmings and all connections, also with main header connecting the four boilers with necessary valves. Used for 9 months.

2 72x18 Triple-riveted Boilers, with all connections and equipment, 150 lbs. working pressure.

1 5' Huntington Mill, all complete.

A bargain in an "Erie City" 100 H. P. Portable "Economizer" Boiler on skids.

THOUSANDS OF OTHER ITEMS.

80,000 Hewn Ties.
500 Sets of Switch Ties.
500 Frogs, Crossings, etc. Switch Stands.
10,000 Pressed Steel Rail Braces, Rail Benders and Drills.
5,000 Ohio Brass Co.'s Solid Terminal 37" Rail Bonds.
200 "Brights" Registering Turnstiles.
200 Roll Top Desks.
200 Typewriters' Desks.
150 Directors' Tables.
25,000 Bamboo Poles, 40' long.
1,000 Flag Poles, assorted sizes.
5,000 Assorted Flags.
50 all steel Dump Cars, 3' 11" x 2' 9" x 2', built by Fairbanks, Morse & Co.
A complete Metropolitan Fire Department—Engine, Chemical Hose Cart, etc., etc.
3 Railroad Trestles, averaging 200' long.
100,000 Doors.
6 miles of steel riveted knock-down Pipe, size 16".

ELECTRICAL APPARATUS.

100 miles of Stranded Copper, triple braid and Rubber-Covered Feed Wires, sizes 1/0 to 600,000 C. M.
2,000,000 lbs. Rubber-Covered and Weather-proof Copper Wire, sizes from No. 14 to 500,000 C. M.
1,600,000 lbs. Lead-Covered, Rubber-Incased Copper Cable, single and three conductor, sizes ranging from No. 14 to 500,000 C. M.
150,000 brand new Incandescent Lamps, never used, General Electric make, 8 candle-power, 100 to 104 voltage.
300,000 good second-hand Incandescent Lamps, 8 and 16 candle-power.
20,000 natural color, brand new Incandescent Lamps, General Electric make, 104 voltage, 8 candle-power, in all colors.
1,000,000 No. 9171 Porcelain Receptacles, Edison base.
All kinds of Tubes, Cleats, Knobs, etc.
1,000 sets of Insulated Trolley Hangers.
50 Trolley Crossings.
2,000 Trolley Braces, 9' 6" and 10'.
Switches, Fuse Plugs, Sockets, etc.
Voltmeters, Ammeters and Watt Meters.
50 Motors, 500 volt, from 1 to 15 H. P.
3 100 K. W. "Maloney" Transformers.
50 Transformers of smaller sizes.
An enormous stock of other items in the Electrical Line.

HIGH PRESSURE VALVES.

500 extra high pressure, especially constructed brass-trimmed Valves, sizes 12 to 42", which we offer at a saving of at least 40% from the price of new Valves. We guarantee them in absolutely first-class condition. All Valves are tested before shipment. Also Valves of all kinds. Send for our complete list.

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53 miles of heavy flanged Hydraulic and high-pressure wrought-iron lap-welded Pipe, ranging in sizes from 10 to 16". This Pipe is flanged with tongued and grooved flanges, and will stand a higher pressure than any Pipe manufactured. We can furnish with this Pipe Crosses, Ells, Tees and a full line of Valves to match.

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505 PEARL STREET, NEW YORK

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2556 A POSITION on the staff of THE ENGINEERING AND MINING JOURNAL is open to a young engineer who has had practical experience in anthracite and bituminous coal mining. Ability to read French and German, and a good working knowledge of English composition are essential requirements. Address "Editor." T. F.

2559 MINE FOREMAN WANTED; all-round miner and machine runner, with experience in large orebodies; one who possesses ability to handle men and who would devote his entire time to the underground work. Position of Mine Foreman is open to one who can fill the bill, with large iron mine in the East. Must be sober, married man, and one less than 45 years preferred. Give full particulars in first instance and a reference from a mine superintendent or foreman. Address "T. C.," Engineering and Mining Journal. 12.30

2560 ASSAYER for refining plant in large Mexican city. Must be expert in silver and gold work and be able to show high-grade record. Good salary to steady and sober man. Knowledge of Spanish not necessary. State present employment. Address "Refinery," Engineering and Mining Journal. 12.30

2562 WANTED—By large bituminous coal mining company, one competent railroad instrument man, who is not afraid of hard work and long hours, to learn mining engineering; one preferred who can also do office work; give references in detail, with dates; $75 per month. Also common-sense tipple man, to design several new tipples with revolving screens, crushers and elevators. None but competent men need apply. Address "W. Va.," Engineering and Mining Journal. 1.13

2563 THE BEST RESOLUTION a man can start the NEW YEAR with is, to secure the position for which he is best adapted. Our business is to help you find that place. We may now have it among the thousands on file at our various offices in the larger cities. If your name is not listed with us, it should be. *Write* us for information *to-day*. HAPGOODS, Suite 511, 309 Broadway, New York City. T. F.

2564 WANTED—Party, 30 or 35 years of age, to join me in a prospecting trip in State of Washington next July. Have had some mining experience, and prefer man with some. Can give, and expect, good references. Address Box 365, Casey, Ill. 1.6

2565 WANTED — High-class technical chemist for research work. Must have an extended experience in chemical and physical testing of hydrocarbon minerals, including asphalts, ozokerite, elaterite, gilsonite, together with the various by-products obtained from these and other allied substances; only those with expert knowledge need apply. Address, with full particulars, J. Dunraven Young, Suite 1733, Monadnock Bldg., Chicago, Ill. 1.6

2566 WANTED—Traveling ore buyer familiar with Western practice on lead and copper ores. Only those having had metallurgical experience, and also experience in ore buying, need apply. Address "Plumbum," Engineering and Mining Journal. 1.6

2567 AN energetic, experienced mine bookkeeper, one familiar with the cost system of accounts and capable of handling the system in all its details, at a large mining corporation in a healthful Western locality. In answering, give complete details as to references, experience, salary expected, married or single, age, etc. A knowledge of Spanish is desirable, but not necessary. Address "Combination," Engineering and Mining Journal. 1.6

SITUATIONS WANTED.

Advertisements under this heading, 50 cents for 50 words or less. Additional words, two cents a word. Cash or stamps must accompany order.

A YOUNG MAN, not afraid of work, experienced in storeroom, purchasing agent department, cost, paymaster and general mine office work, desires to improve position. Several years with mining and allied companies; excellent references. Any location, here or abroad. Address "C. T.," Engineering and Mining Journal. No. 21,783, Dec. 30.

A YOUNG Mining Engineer, skilled in all branches of the profession, a graduate of the School of Mines, Columbia College; 10 years' varied experience, at present Assistant Superintendent of a large iron mining company, desires a position as Mining Engineer, Superintendent or Manager of a mining company. First-class references and an A1 man. Only first-class propositions considered. Address "C. C. W.," Engineering and Mining Journal. No. 21,731, Jan. 6.

A YOUNG MAN (25), with 3 years' training in a Western mining school and considerable experience in assaying, desires employment with a mining engineer who has considerable examination and construction work in the West. Good draughtsman, and some experience in surveying. Address "W. J.," Engineering and Mining Journal. No. 21,779, Jan. 6.

AN Executive Accountant for mining and similar operations desires engagement. Thoroughly understands auditing, systematizing, cost methods, office managing, commissary and general business details. Can assist in supervision of surface work. Strictly high-grade, experienced services. Age 36. Character A1. Salary $150 per month and expense allowance. Will go foreign. Address "W. S.," Engineering and Mining Journal, Lohmiedell Bldg., San Francisco, Cal. No. 21,747, Jan. 20.

CHEMIST and Assayer, with 8 years' practical experience at custom smelters, mines and mills in the West, is open for engagement; sober and industrious. At present filling responsible position in Southwestern mining camp. Reasons given for leaving present place. Address "R. A. J.," Engineering and Mining Journal. No. 21,787, Dec. 30.

CIVIL and Mining Engineer desires responsible position. Age 28; single; technical graduate; 8 years' practical experience in general mine and coke-oven work.. At present chief engineer of coal company. Good reasons for changing. Will refer to past and present employers. Address "E. D. A.," Engineering and Mining Journal.. No. 21,789, Jan. 13.

CONSTRUCTING ENGINEER, 12 years' experience in United States and Africa, equipping alluvial mines (dredge and hydraulic) and superintending same when working, wishes position after January 1, 1906. Well recommended. Address "B.," Engineering and Mining Journal. No. 21,774, Dec. 30.

CYANIDE process operator wants position. Is first-class chemist and assayer, and has handled many varieties of cyanide process, including slimes treatment. Has planned and erected plants. Thoroughly experienced mill man and amalgamator, and familiar with mining work generally. Speaks Spanish. Any locality. Address "Operator," Engineering and Mining Journal. No. 21,791, Jan. 20.

ELECTRICAL and Mechanical Engineer, technical graduate; 31; single; 10 years' experience, design construction, operation power plants, steam and hydraulic, long-distance transmission, mill and mine installations; capable of taking charge construction or operation power plant; at present employed large electric concern New York City; best references. Minimum salary expected, $150 per month. Address "B. W. T.," Engineering and Mining Journal. No. 21,782, Dec. 30.

ENGINEER, successful as superintendent of mining and milling where close administration was necessary, seeks the charge of mining business. Best reference, obtained in Idaho, Butte, Utah and Colorado. Subordinately employed by the Federal Mining & Smelting Co. Good experience in examining mines and oil lands. Address T. Worth Bowen, Wallace, Idaho. No. 21,760, Dec. 30.

GRADUATE (1905) of the chemical department, University of Michigan, desires work with a mining, milling or smelting company, or in a commercial laboratory. Am a thorough analytical chemist and assayer, also have a good working knowledge of ore testing, surveying, and drafting. Opportunity more desirable than salary at present. References furnished. Address "C. W. L.," 212 E. William st., Ann Arbor, Mich. No. 21,729, Jan. 20.

MANAGER desires change January 1. Present position $300 per month and expenses. Ten years' experience in U. S. Excellent references. Address "Manager," 206 Boston Bldg., Denver, Colo. No. 21,720, Dec. 30.

MANAGEMENT of gold, silver or copper property wanted by American engineer, now in same work. At liberty January, 1906. Present position worth £1,500 per annum. Age 34, married; practical experience—12 years of underground, milling, cyaniding, civil engineering and office work. Address "M. A. W.," P. O. Box 67, Oak Park, Illinois. No. 21,777, Jan. 27.

MINING ENGINEER, graduate of a first-class technical college; experienced in coal mining; holds good position, but wishes to change. Desires to take up metal mining, preferably in Mexico or western United States. Address "H. C.," Engineering and Mining Journal. No. 21,781, Dec. 30.

MINING and Mechanical Engineer having a thorough technical training and a wide range of practical experience in designing, construction and management, is open to an engagement as consulting engineer. Thoroughly posted in power economy, and in the most up-to-date labor-saving equipments. Has installed many very important plants that meet every requirement. Address "Consultation," Engineering and Mining Journal. No. 21,523, t. f.

MINING ENGINEER, graduate Columbia School of Mines (1900), with 5 years' experience as engineer and superintendent of mines, is open for a position.. Can speak Spanish. Address "H.," Engineering and Mining Journal. No. 21,776, Jan. 6.

MINING ENGINEER wants position.. Is graduate metallurgist, assayer and surveyor and has had thorough experience in stamp milling and cyaniding. Several years' experience in examining and reporting on mines and familiar with the practical work of mining. Speaks Spanish. Would like position as superintendent of development of promising property. Address "Deposit," Engineering and Mining Journal. No. 21,792, Jan. 20.

MINING ENGINEER, with 18 years' experience as manager and superintendent of mines and mills in the United States, Mexico, Central and South America, wishes position in mild climate. Is practical and technical in all departments. Can make a mining proposition pay dividends, if there be any possibility for it to do so. Salary $250 a month.. References unexcelled. Address "C. P. J.," Engineering and Mining Journal. No. 21,788, Jan. 27.

MINING ENGINEER and Metallurgist open for engagement; 14 years actively connected with several of the largest copper and gold producers in Australia, Mexico and the United States. Will develop properties, design, erect and operate plants for the reduction of these metals. Understands assaying, accounting, purchasing of supplies and other details. Address P. O. Box 656, San Francisco, Cal. No. 21,770, Jan. 6.

POSITION by man with practical experience in the roasting and the magnetic and electrical separation of zinc iron ores; capable of handling commercial or experimental work; who also has had experience as superintendent of wet concentrating mills. Address "R. J.," Engineering and Mining Journal, 206 Boston Bldg., Denver, Colo. No. 21,778, Dec. 30.

SITUATION WANTED with a mining company, to locate gold dredging, placer or copper property. Address "F.," Engineering and Mining Journal. No. 21,785, Jan. 6.

SURGEON, American, speaking Spanish, wants surgical contract with mining or smelting company or other large employer, in Mexico or anywhere. Has practiced in Mexico and since 1899 in Chicago. An able man. Would pay liberal sum for suggestion of good camp needing doctor. Address "H. F. W.," Engineering and Mining Journal. No. 21,764, Jan. 6.

WANTED—Position as assayer at mine or assistant in smelter laboratory, by student in a leading Western school of mines. Has had 3 years' school of mines training and is practical assayer. Speaks some Spanish. References. Box 245, Engineering and Mining Journal. No. 21,790, Jan. 13.

(*See also page* 50.)

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Address JOE EHRMANNTRAUT, Prop. the "Angus," or CHAS. A. DEVLAN, M. E., Boise, Idaho. 12.30

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THE ENGINEERING AND MINING JOURNAL
505 PEARL ST., NEW YORK CITY

SITUATIONS WANTED.

(*See also page 49.*)

WANTED—Position with reliable concern, as superintendent, foreman, engineer or all combined, by technical graduate. Nine years' practical experience underground and at smelters and mills; capable; thoroughly reliable; aged 32. Now superintendent, but will engage immediately and go anywhere. References exchanged. State salary, general particulars, chances advancement. Address "Miner," Engineering and Mining Journal.
No. 21,767, Dec. 30.

WELL-EDUCATED young man, with 5 years' mining experience, wants position in any part of the world. Abundant health and strength. Address "C. H. L.," Engineering and Mining Journal.
No. 21,786, Dec. 30.

YOUNG ENGINEER, Columbia graduate, of business ability, wants work with mining, milling, smelting, engineering or prospecting company, where he will have chance to prove his merit by hard, faithful work. Knowledge of geology, assaying, bookkeeping, drafting, surveying, metallurgy, German, Spanish. Have worked underground. Address "Mining," 1328 Marrion st., Denver, Colo.
No. 21,784, Jan. 6.

WANTED Information as to available deposits of **Magnetic Iron.** We are owners of special processes for the separation of magnetic iron from **Ores, Sands, Shop Wastes. Etc.;** and wish to correspond with engineers or owners of properties suitable for operations by dredging, mining and milling, and separation by special machinery.

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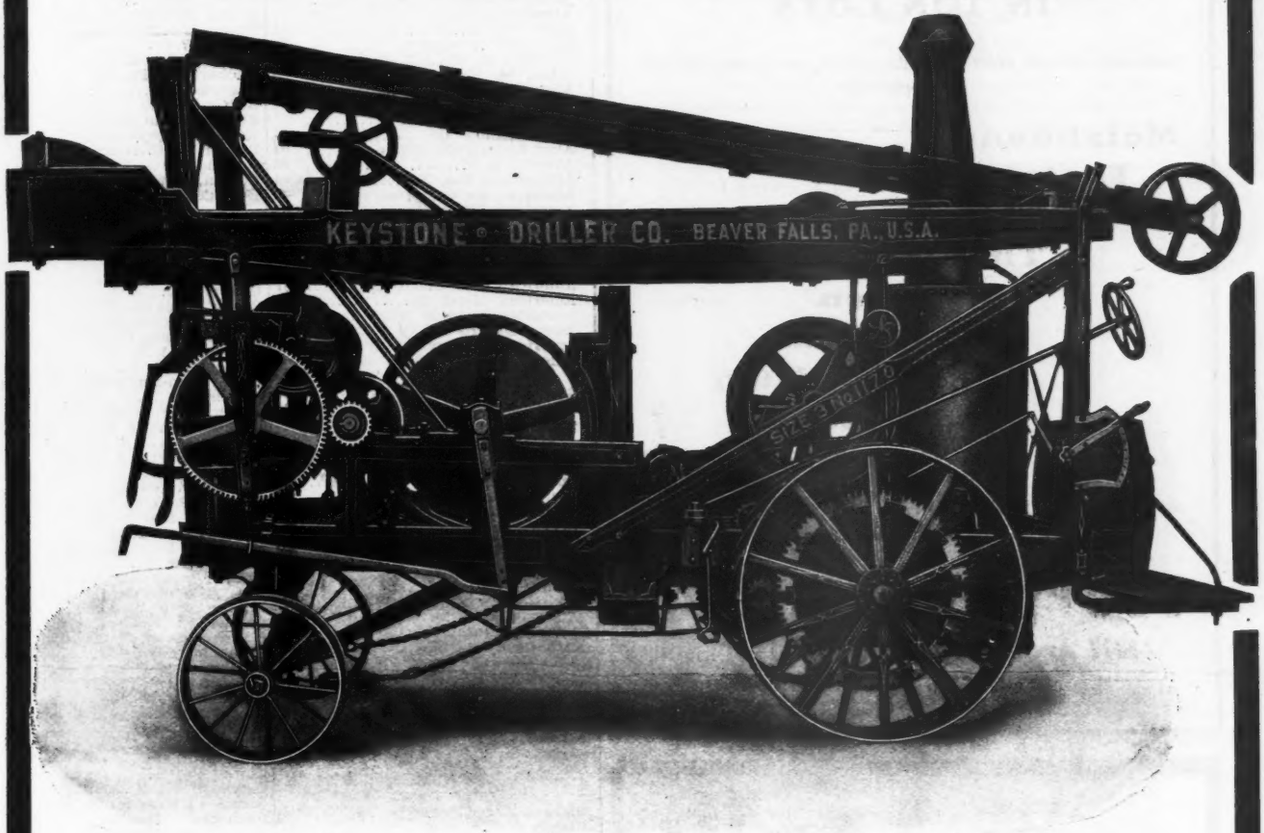

We have just reprinted in sumptuous style our CATALOG No. 2 of MINERAL PROSPECTING AND PLACER TESTING MACHINERY, and we wish to place a copy of it in the hands of every engineer and mining man who has so lively a sense of his own best interest as to ask for it.

The greater part of the book is given to a scientific, but thoroughly practical, discussion of the process of Dredge Installation, the Mapping of Placer Gold Deposits, Lead and Zinc Prospecting, Coal Testing, etc. It contains the complete story, written by men who are experts and specialists in this line. No space is wasted in theorizing. The text is profusely and attractively illustrated with plates, the preparation of which has been attended with a great deal of difficulty and expense. We believe that this catalogue is

THE MOST ACCURATE AND RELIABLE WORK ON THE SUBJECT OF MINERAL PROSPECTING WITH WELL DRILLS EVER PUBLISHED.

We have now ready, also, the 1906 edition of our four other catalogs—No. 1, Water Well Machinery; No. 2B, Keystone Percussion Core Drills; No. 3, Deep Well Machinery, for Oil and Gas Drilling; No. 4, Contractors' Drills for Blast Holes, Bridge Soundings, etc.

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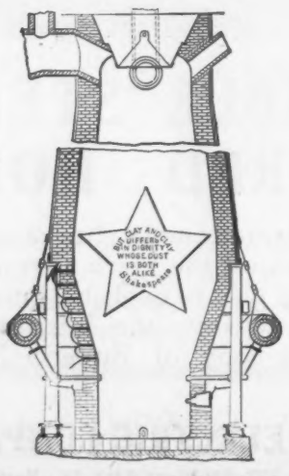

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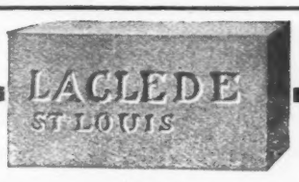

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Notice is hereby given that the deferred meeting of the stockholders of the Johnston Publishing Company will be held at the office of the corporation, 505 Pearl Street, Borough of Manhattan, City of New York, on Wednesday, the seventeenth day of January, 1906, at 2 P. M., for the election of directors and presentation of financial and officers' reports, and the transaction of such other business as may properly come before such a meeting. Transfer books will close January 6th.

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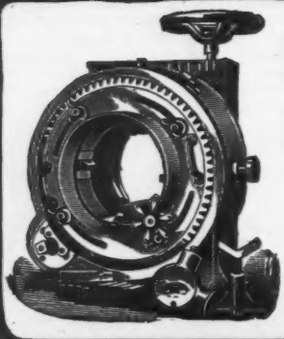

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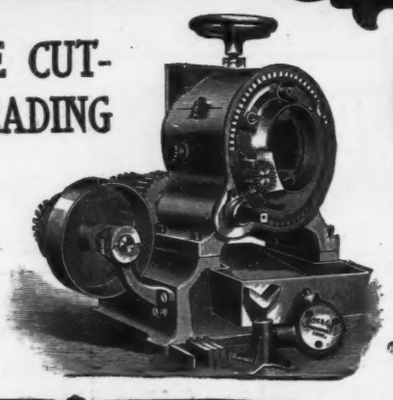

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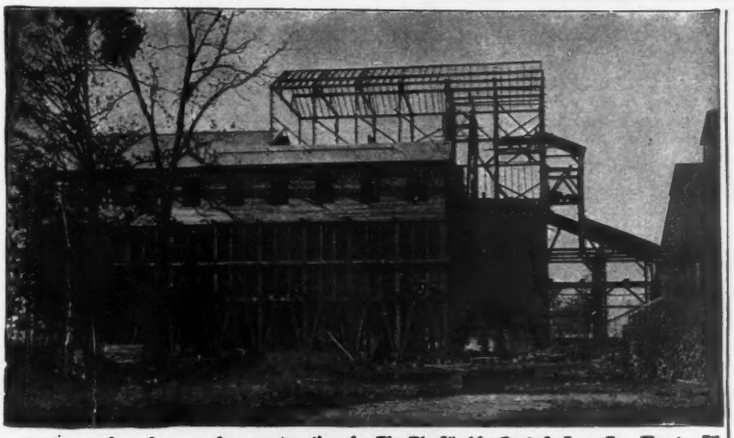

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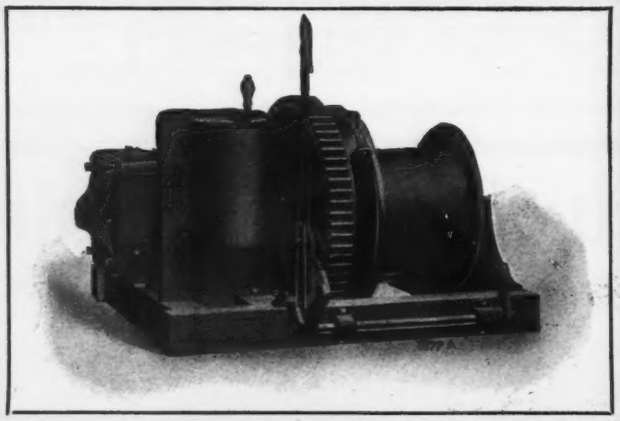

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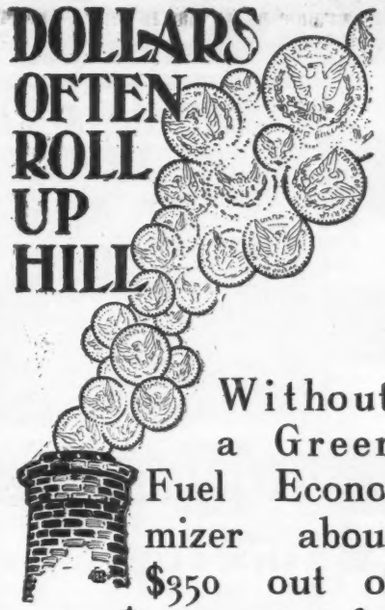

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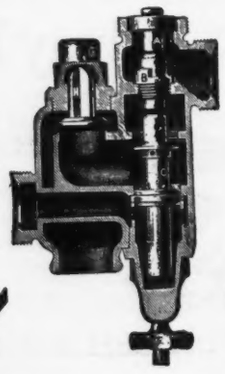

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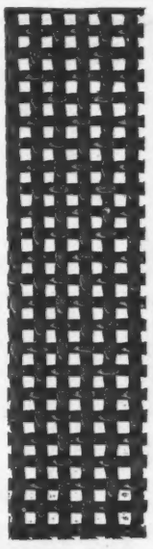

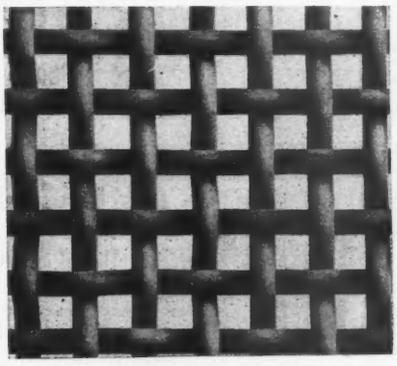

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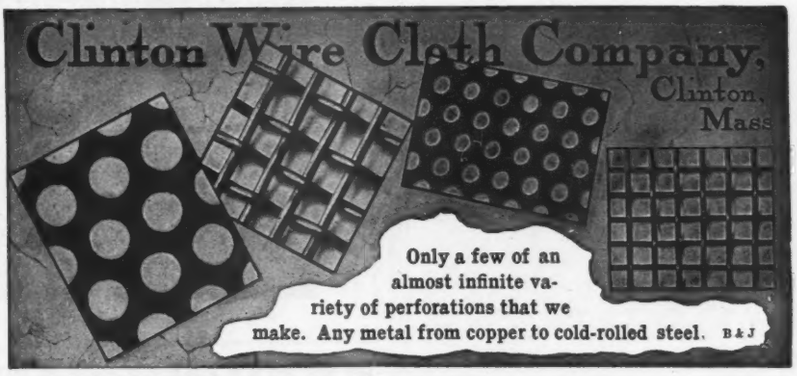
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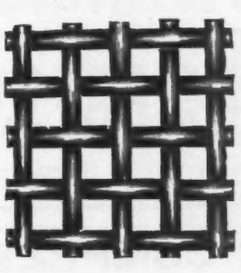

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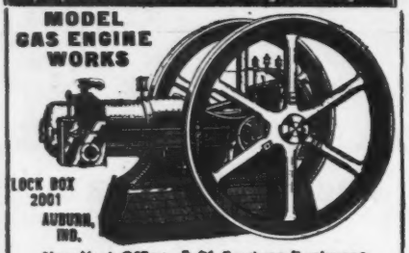

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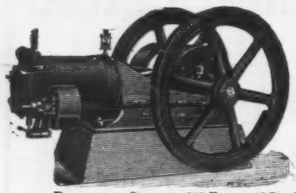

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The line to Manitou, Cascade, Green Mountain Falls, Manitou Park, Cripple Creek, Buena Vista, Leadville, Aspen, Glenwood, New Castle, Grand Junction, Salt Lake, Ogden and the West.

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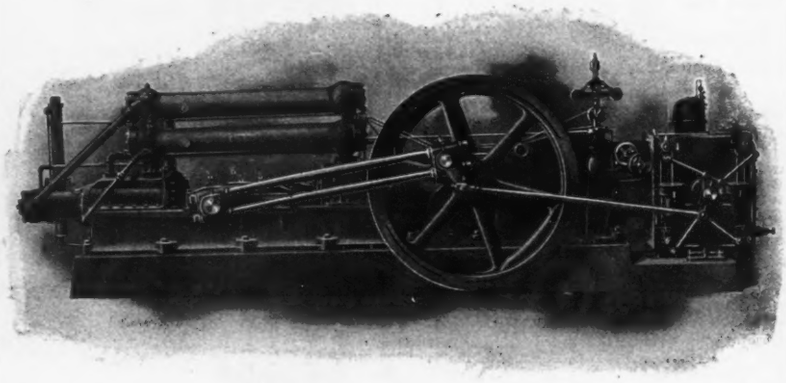

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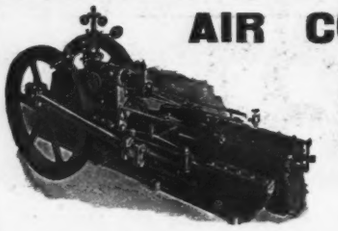

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THE IDEAL EXPLOSIVES. WILL NOT FREEZE ABOVE 35° F. DO NOT THROW OFF AS GREAT QUANTITIES OF FUMES AS OTHER POWDERS.

Safe to handle because they contain only half the quantity of Nitro-Glycerine that other powders contain.

Read what the largest consumer of Dynamite in the State of Colorado says about them:

STRATTON'S INDEPENDENCE LTD.
CRIPPLE CREEK DISTRICT, COLORADO.
THOMAS CORNISH, Manager. Victor, Colorado.

VICTOR, COLORADO, April 29, 1903.

The Batopilas Mining Co.,
45 Broadway, New York.

Gentlemen—We are in receipt of yours of the 25th, regarding the merits of Nitro Plastine powder, which has our attention.

We have used 40 per cent. Nitro Plastine Powder for the last five months, and have found it the most satisfactory powder we have ever used on the property.

We are using this powder in conjunction with double tape Climax fuse and Repauno quadruple (the best) caps, and in the whole five months, have not had a missed shot that we could trace to the powder.

Our ground is quite hard in many parts of the mine, and Mr. Cornish, our Manager (who has been mining for 35 years), states that the powder pulverizes better than any powder he has used, and we get better values from our ore through screenings and having less rock to sort with the chances of quite a little of it going over the dump.

We have never met the makers of this powder, and their agent Mr. A. A. Maclean of Denver, got our order for the powder after a very severe test and much opposition from their competitors, so that it stands strictly on its merits.

Of course, as we use a ton a day, if we could find a better powder for the same money, or as good a powder for less, we would certainly use it.

Any further information we shall be pleased to give.

Yours truly,
W. W. TRAVELL, Purchasing Agent.

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Telephone, 921 Broad.
130 Pearl St. 96 Water St.

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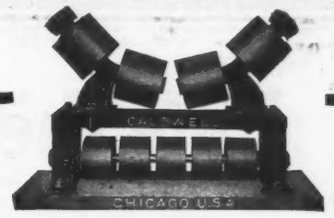
Gentlemen—We have used your Plastine for wrecks and submarine rock work. We think it equal if not superior to any we have tried in strength, and superior to any in certainty of explosion in all weathers and temperatures. Expect to use it in our Saugerties rock contract.

Very truly yours,
R. G. PACKARD, President.

NITRO POWDER CO., KINGSTON, N. Y.



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Economical and satisfactory—nothing to get out of order.

Complete Handling Equipments.

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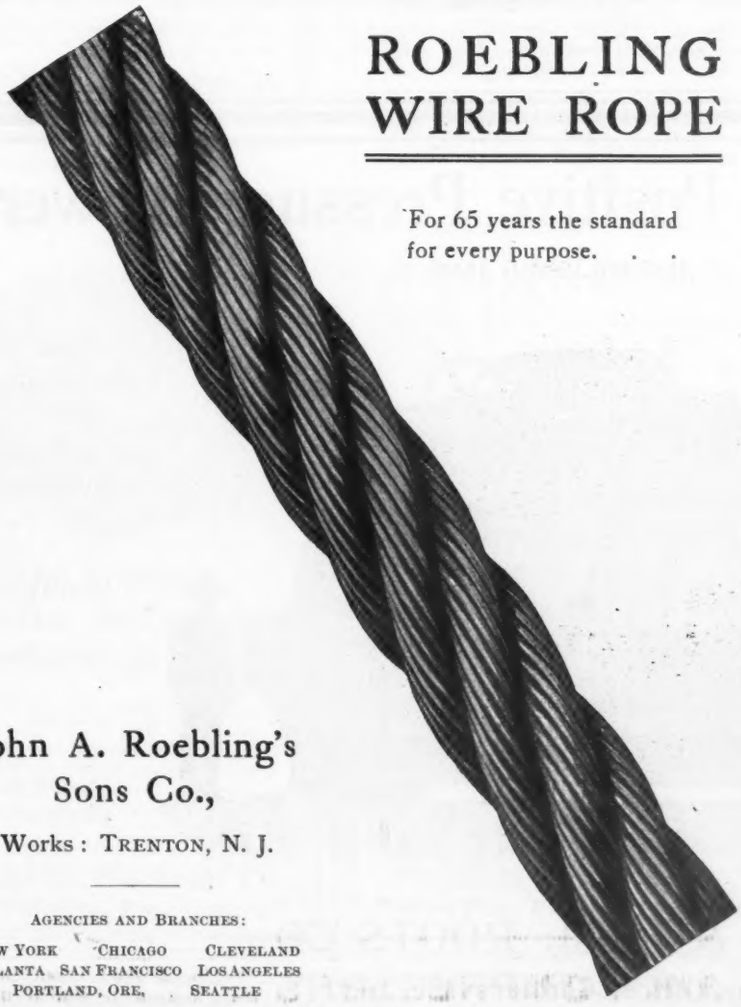

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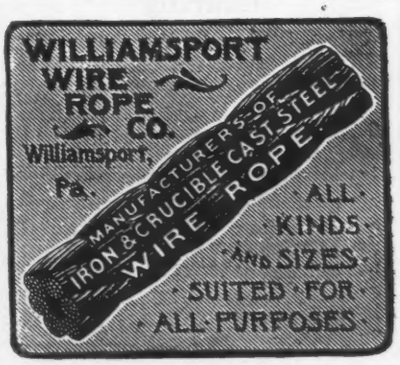

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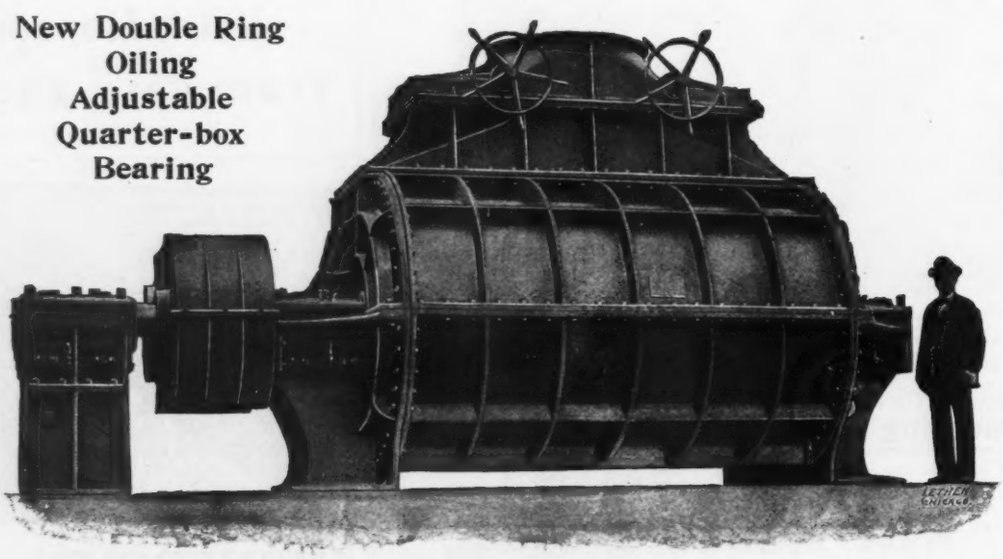

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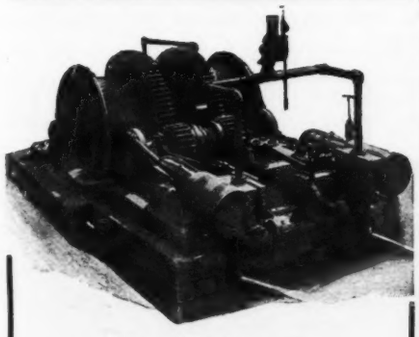

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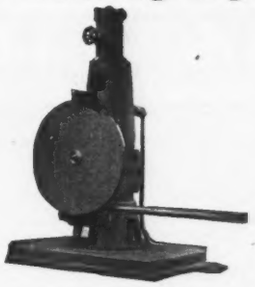

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If the engine moves beyond a certain point the CONTROLLER MUST ACT. It shuts off steam and sets brake INSTANTLY.

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The Emerson Steam Pump

Best in the World for

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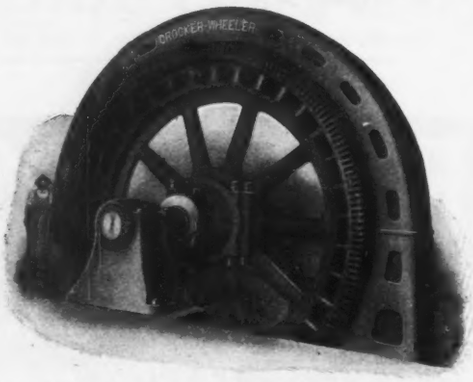
LARGEST GAS-ENGINE-DRIVEN ALTERNATOR EVER BUILT



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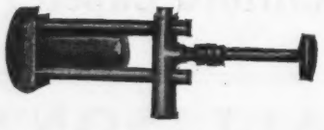

This BURNER will do more work on one quart of gasoline per hour than any other burner, and has been doing it for twenty-three years. Price $6.00. Cleaned free. Send for catalogue.

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Nos. 8 & 10

70,000 SOLD IN 15 YEARS
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No. 8	" 4000 "	"	2 Men
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Complete Outfits including Pump, Suction and conducting Hose, Couplings and Strainer.

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For Placer Mining a Specialty

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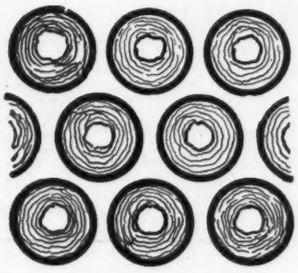
This is How the DEARBORN TREATMENT Removes Scale from the Boiler



Before using Dearborn treatment. Scale thick.

After one month's treatment.

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Four months' treatment. Scale entirely removed.

Not only does the Dearborn Treatment remove scale from the boiler but it purifies *any* water and prevents new scale from forming, thus insuring full efficiency of the boiler and a low steam cost. Send us a gallon of the water you are now using, for complete analysis, and we will prepare a special treatment for it, for your approval.

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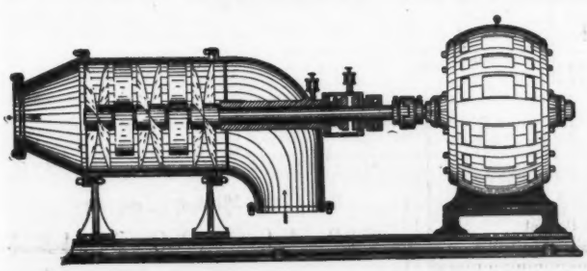

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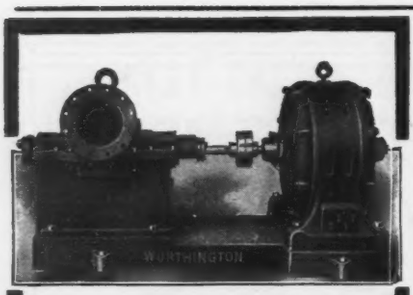

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LOW STARTING EFFORT

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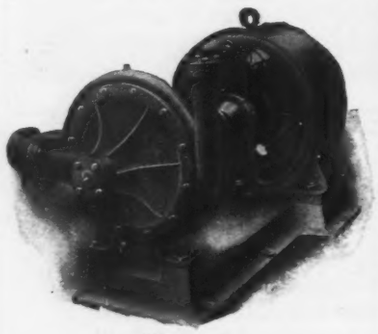

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The Pulsometer Steam Pump

Requires no engine, belt, oil, packing or special foundation. Operates as well suspended as stationary, and may be raised or lowered as occasion demands without interrupting its work. Having no exhaust steam to be disposed of (steam condenses and passes off with water discharged), it is particularly well adapted for underground service.
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Easy to Install **Easy to Operate**

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Consequently live longer than those that can, and do

Our "UNION" FRICTIONLESS SUCTION DIAPHRAGM TRENCH PUMPS are the most economical pumps on earth for Mud, Gravel, Drainage, Sanitary Deposits, Quicksands, etc., and are steady workers.

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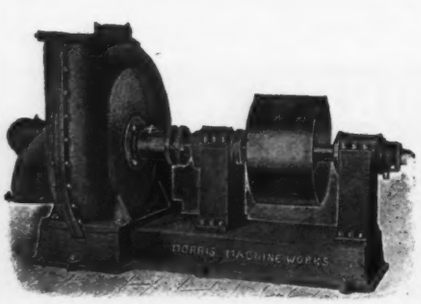

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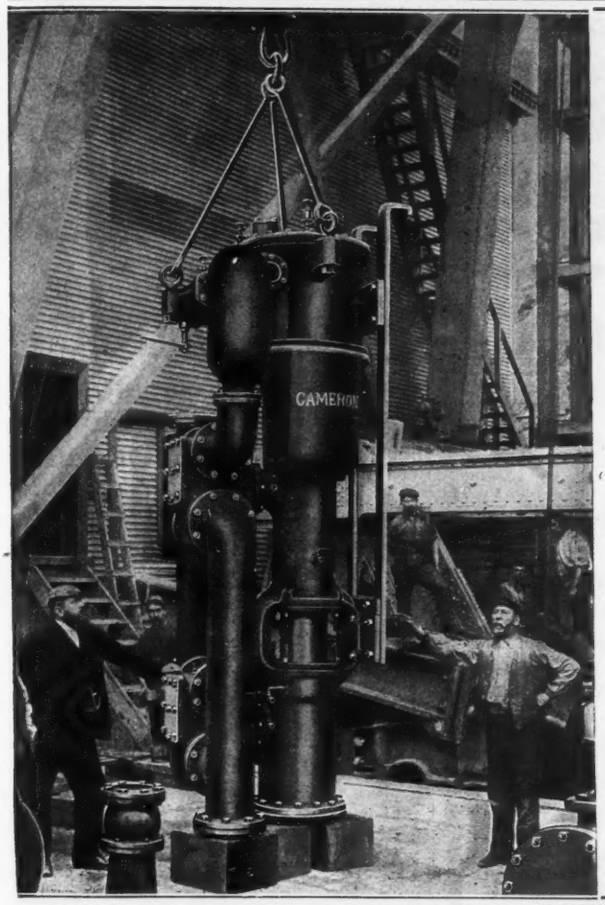

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Cameron
Vertical Plunger Sinking Pumps

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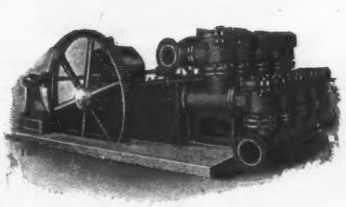

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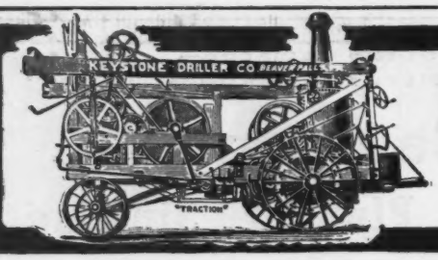

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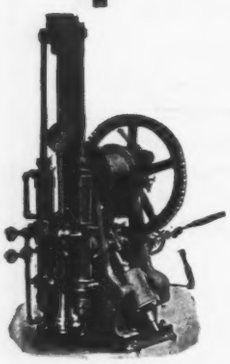

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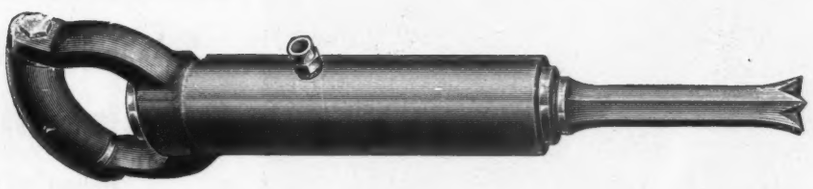

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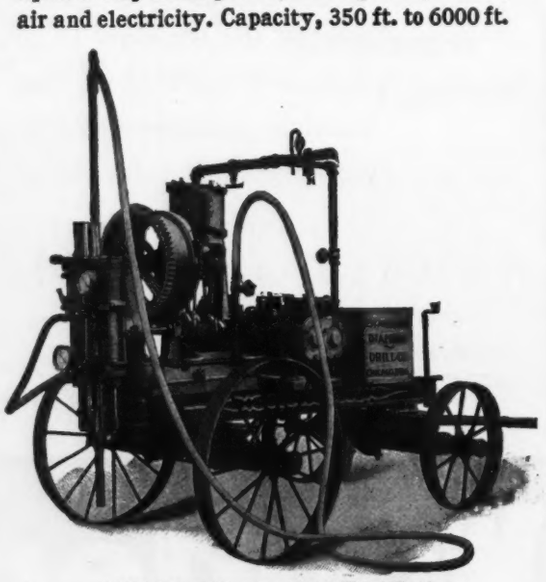

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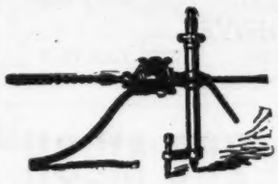

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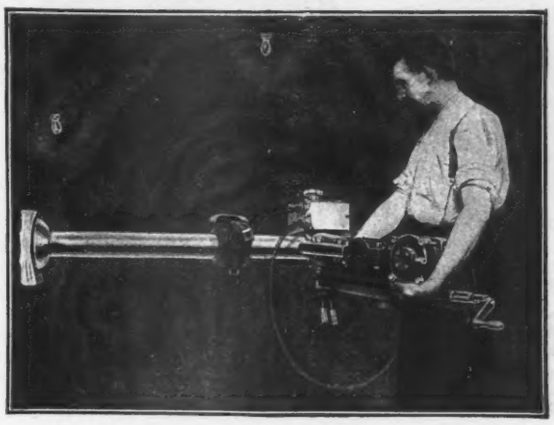

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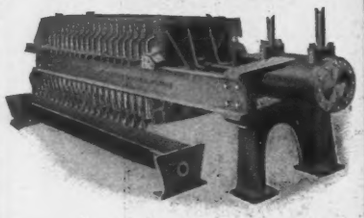

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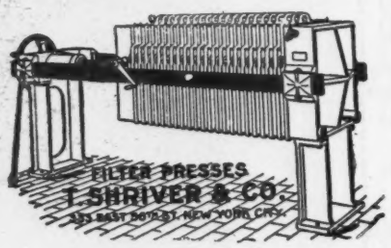

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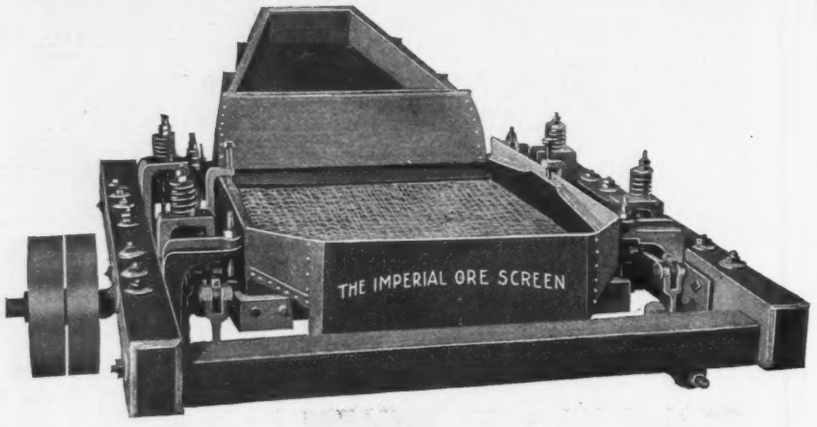

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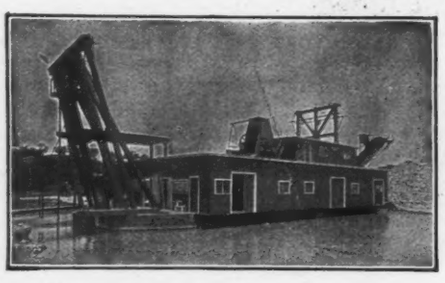

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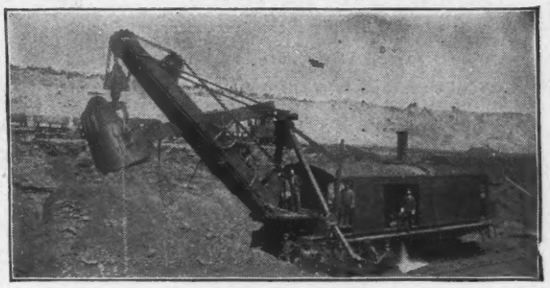

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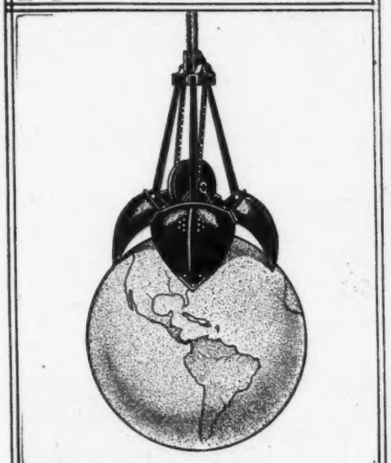

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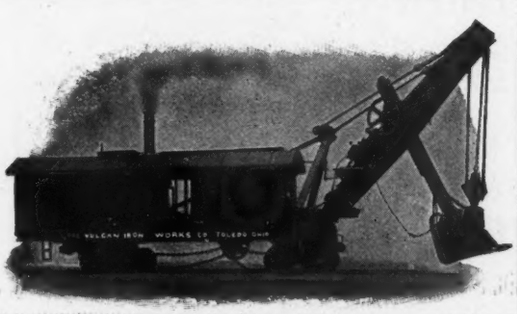

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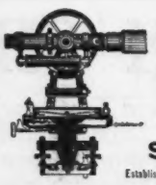

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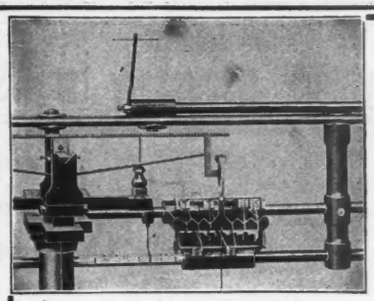

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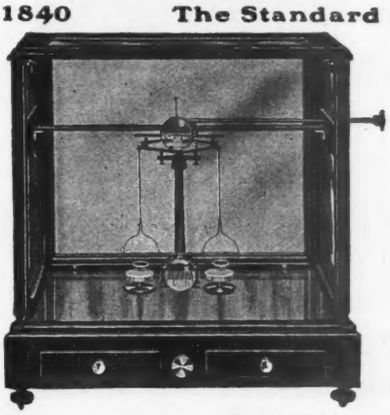

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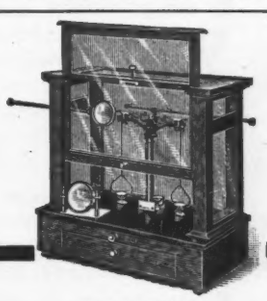

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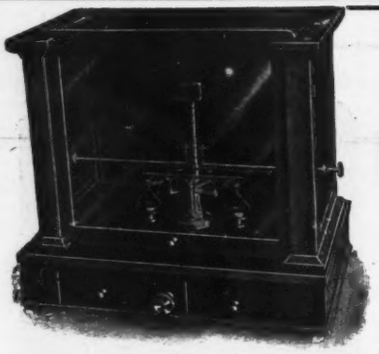

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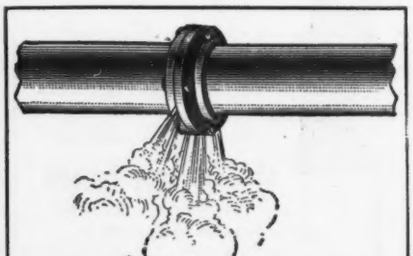

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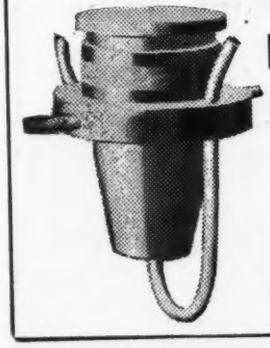

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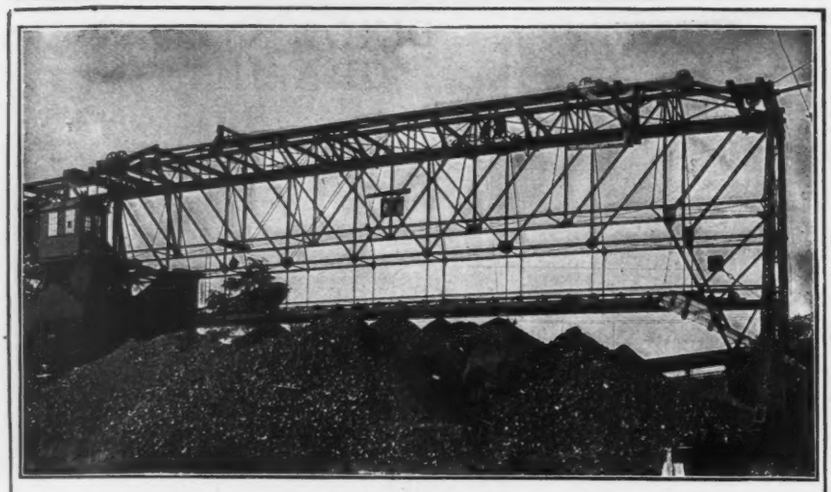

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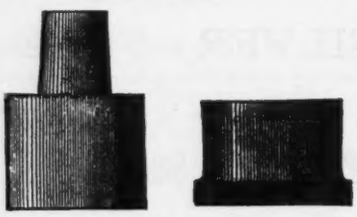

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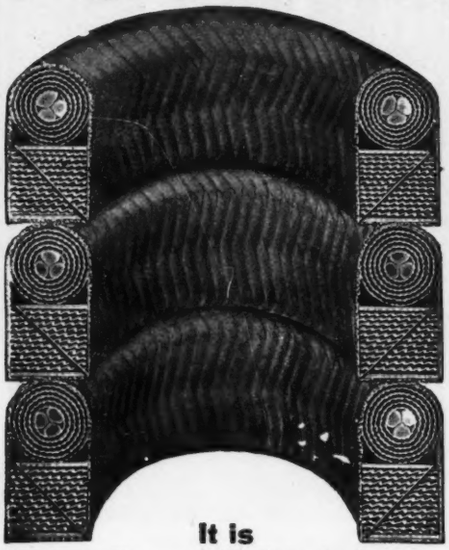

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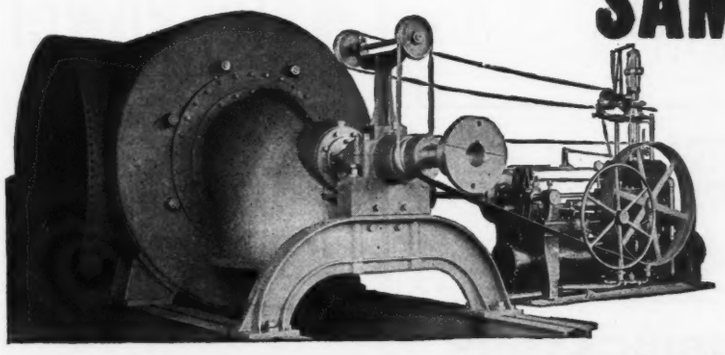

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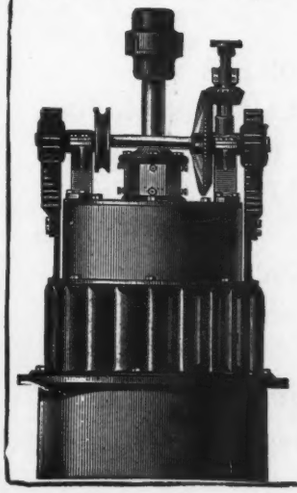

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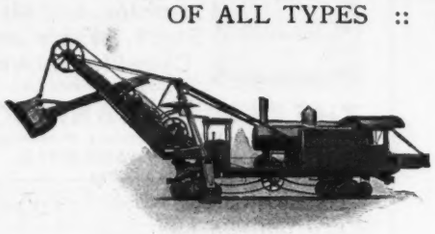

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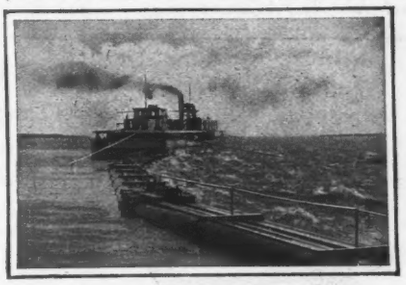

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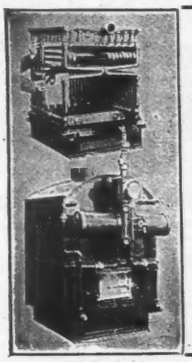

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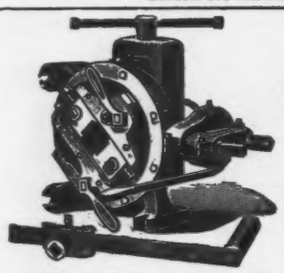

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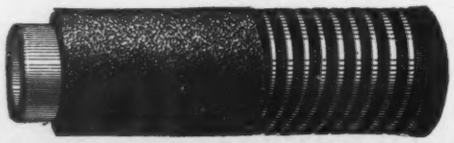

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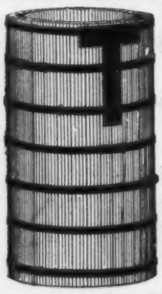

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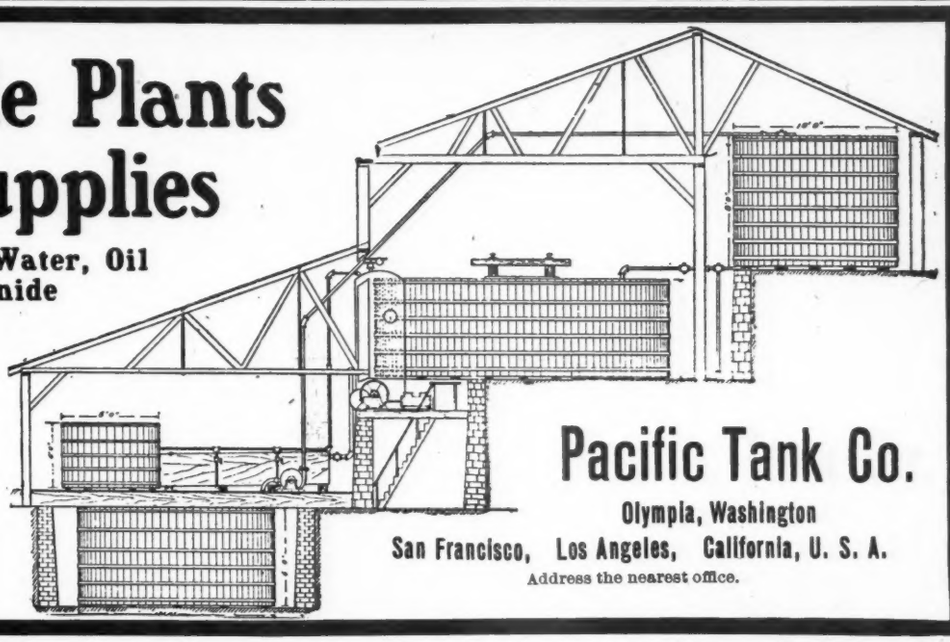

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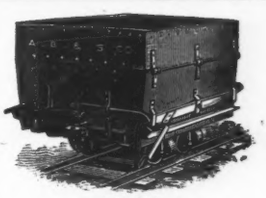

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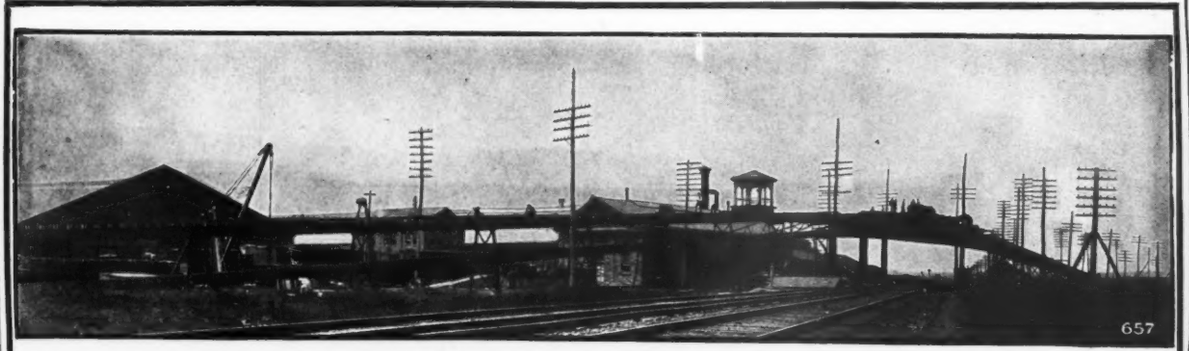

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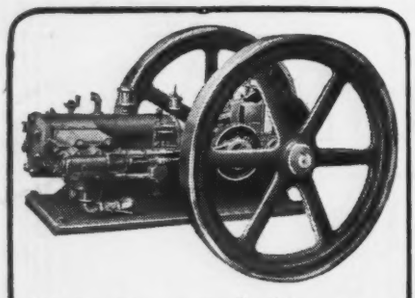

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